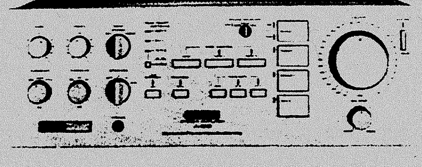
PIONEER

Service Manual

CIRCUIT DESCRIPTIONS
REPAIR & ADJUSTMENTS



ORDER NO.
ARP-344-0

STEREO AMPLIFIER

A-90

- This service manual is applicable to the KU type.

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PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS [USA] INC. 1925 E. Dominguez St., Long Beach, California 90810 U.S.A.
PIONEER ELECTRONIC [EUROPE] N.V. Keetberglaan 1, 2740 Beveren, Belgium
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia

YX © APR. 1983 Printed in Japan

1. SPECIFICATIONS

Amplifier Section

Continuous Average Power Output is 200 watts* per channel, min., at 8 ohms from 20 Hertz to 20,000 Hertz with no more than 0.002 % total harmonic distortion.**

Continuous Power Output at 1kHz (both channel driven)	
T. H. D. 0.002%, 8 ohms	220watts per channel
Total Harmonic Distortion (20 Hertz to 20,000 Hertz, 8 ohms)	
continuous rated power output	**No more than 0.002%
100 watts per channel power output	**No more than 0.002%
Intermodulation Distortion (50 Hertz: 7,000 Hertz = 4 : 1, 8 ohms)	
continuous rated power output	No more than 0.002%
Damping Factor (20 Hertz to 20,000 Hertz, 8 ohms)	100
Input (Sensitivity/Impedance)	
PHONO MM	2.5mV/50 kilohms
PHONO MC	150µV/100 ohms, 33 ohms
TUNER, CD/AUX1, AUX2, TAPE PLAY 1, 2	150 mV/50 kilohms
Phono Overload Level (T.H.D. 0.008%, 1,000Hz)	
PHONO MM	300mV
PHONO MC	18mV
Output Level/Impedance	
TAPE REC 1, 2	150mV/2.2 kilohms
Frequency Response	
PHONO MM (RIAA Equalization)	20Hz to 100,000Hz±0.2dB
TUNER, CD/AUX1, AUX2, TAPE PLAY 1, 2	5Hz to 100,000Hz $^{+0}_{-3}$dB
Tone Control	
BASS	±6dB (100Hz) at 200Hz Position
	Turnover frequency: 100Hz/200Hz/400Hz
TREBLE	±6dB (10kHz) at 4kHz Position
	Turnover frequency: 2kHz/4kHz/8kHz
Filter	
LOW (SUBSONIC)	15Hz (−6dB/oct.)
Hum and Noise (IHF, short circuited A network)	
PHONO MM	89dB
PHONO MC	74dB
TUNER, CD/AUX1, AUX2, TAPE PLAY 1, 2	113dB
Muting	−20dB

Miscellaneous

Power Requirements	120V, 50/60Hz
Power Consumption	350 W (UL)
Dimensions	420(W) x 150(H) x 420(D) mm 16-9/16(W) x 5-7/8(H) x 16-9/16(D) in
Weight (without package)	19.6kg (43 lb 3 oz)

Furnished Parts

Operating Instructions	1

**Measured pursuant to the Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifier.*

***Measured by Shibasoku 725 Automatic Distortion Analyzer.*

NOTE:
Specifications and design subject to possible modification without notice.

QUESTIONNAIRE

MODEL ________________
One Model per questionnaire

Dear Servicer,

Thank you for your cooperation in the post-sale service of Pioneer products.

This questionnaire is used as a tool to improve the serviceability of our products and service manuals. Please evaluate this model and service manual by answering the following questions. Your ideas may be realized in our future products. Your answers will be appreciated. Thank you.

PIONEER ELECTRONIC CORP.

T. Nakagawa, Manager, Service Section, International Division

1. SERVICING EVALUATION	Circle applicable number:	Good		Fair		Poor
a. Disassembly/Re-assembly:		1	2	3	*4	*5
b. Circuit Checks:		1	2	3	*4	*5
c. Replacement of Parts:		1	2	3	*4	*5
d. Adjustment (s):		1	2	3	*4	*5

* If (4) or (5) was circled, please be specific.

e. Your advice, opinion or ideas related to servicing this product.

2. SERVICE MANUAL EVALUATION

a. Circuit & Mechanism Description

b. Circuit Diagram

3. OTHER

Please describe other areas of servicing which you may find difficult.

Completed by : Date :

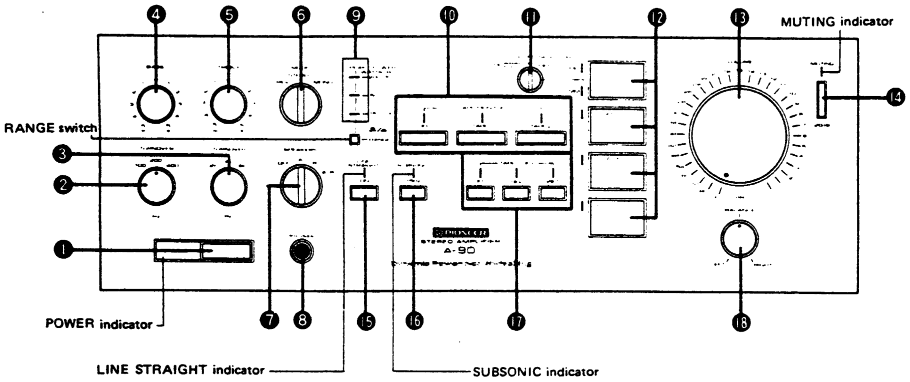
Company Name :

Address :

City/State/Zip :

Please send this form filled to the distributor in your country.

2. FRONT PANEL FACILITIES



❶ POWER SWITCH

Power is supplied to the stereo amplifier when the switch is depressed, and the power indicator changes from red to green. The power is turned off when the switch is released to the OFF position.

❷ BASS TURNOVER CONTROL

This is used to select the frequency at which the BASS control starts to have an effect on the tone quality when it is used for adjustment.

400	Allows the frequency band below 400Hz to be adjusted.
200	Allows the frequency band below 200Hz to be adjusted.
100	Allows the frequency band below 100Hz to be adjusted.

❸ TREBLE TURNOVER CONTROL

This is used to select the frequency at which the TREBLE control starts to have an effect on the tone quality when it is used for adjustment.

2k	Allows the frequency band above 2kHz to be adjusted.
4k	Allows the frequency band above 4kHz to be adjusted.
8k	Allows the frequency band above 8kHz to be adjusted.

❹ BASS CONTROL

This is used to adjust the BASS (low frequency range) sound. When the control is turned clockwise, the level of sound below the frequency selected by the BASS TURNOVER control is emphasised. Conversely, when the control is turned counter-clockwise (↶) from the "0" positon, the level of sound below the frequency selected by the BASS TURNOVER control is attenuated.

NOTE:
The control does not operate if the LINE STRAIGHT switch is ON.

❺ TREBLE CONTROL

This is used to adjust the TREBLE (high frequency range) sound. When the control is turned clockwise, the level of sound above the frequency selected by the TREBLE TURNOVER control is emphasised. Conversely, when the control is turned counter-clockwise (↶) from the "0" position, the levle of sound above the frequency selected by the TREBLE TURNOVER control is attenuated.

NOTE:
The control does not operate if the LINE STRAIGHT switch is ON.

❻ MODE SELECTOR

This is used to select the mode.

REV	Set here to shunt the left channel and right channel stereo input signals and listen in stereo.
STEREO	Set here for ordinary stereo listening.
MONO	Set here to mix the left and right channel stereo input signals and hear them in mono through both the left and right speakers.

NOTE:
The MODE selector does not function when the LINE STRAIGHT switch is in ON position.

❼ SPEAKER SWITCHES

OFF	There is no output signal from either A or B output terminals.
A	Sound is heard from the speakers connected to SPEAKERS A terminals.
B	Sound is heard from the speakers connected to SPEAKERS B terminals.
A + B ...	Sound is heard from the speakers connected to both SPEAKERS A and B terminals.

❽ PHONES JACKS

Connect the plug on your headphones to this jack. To listen to a program through the headphones, turn the SPEAKER switches to OFF.

❾ PEAK POWER WATTS/8Ω INDICATOR

This indicates the output level at 6 stages, when speakers with a nominal impedance of 8 ohm are connected to the SPEAKERS terminals. (When the SPEAKER switches are OFF, it does not light up)

The RANGE SWITCH functions as follows

▀ :	When released, it indicates the high level output (200, 50, 15) in watts.
▄ :	When depressed, it indicates the low level output (5, 1, 0.3) in watts.

❿ TAPE MONITOR SWITCHES

Used to play back a tape or monitor a recording.

TAPE 1	Depress to play back a tape or monitor a recording on the tape deck connected to TAPE 1 PLAY terminals.
TAPE 2	Depress to play back a tape or monitor a recording on the tape deck connected to TAPE 1 PLAY terminals.
OFF	Depress if not playing back a tape or monitoring a recording.

NOTE:
Simultaneous playback or monitoring on TAPE 1 and TAPE 2 is not possible.
Always be careful to depress the TAPE MONITOR switch properly.
If the switch is not depressed, both of the indicators for TAPE 1 and TAPE 2 light up and no sound is heard.

⓫ PHONO SELECTOR

To play a record on the turntable, adjust either MC or MM depending on the cartridge being used.
When using an MC (Moving Coil) Cartridge, position at MC (100Ω or 33Ω).

⓬ FUNCTION SWITCH

This is used to select the program source. At the left of each switch is a FUNCTION indicator, which lights up when the corresponding function has been selected.

PHONO	Depress for playing records on a turntable connected to the PHONO terminals.
TUNER	Depress for listening to a broadcast on a tuner connected to the TUNER terminals.
CD/AUX1 ...	Depress for listenning to the sound from a stereo component connected to the CD/AUX1 jacks.
AUX2	Depress for listenning to the sound from a stereo component connected to the AUX2 jacks.

⓭ VOLUME CONTROL

This is used to adjust the volume of sound heard through the speakers or headphones. The scale shows the attenuation of the dB display. No sound is heard wheh the control is set at "∞". Turn slowly in a clockwise direction (↷).

⓮ MUTING – 20dB SWITCH

The volume is attenuated by 20dB when this switch is depressed to the ON position (MUTING indicator lights up). The switch can be used effectively when the stylus descends onto the record during record play, when the sound is to be turned down temporarily and when you want to adjust the sound precisely as you listen to a program source under low sound level conditions.

⓯ LINE STRAIGHT SWITCH

When the switch is depressed to OFF position (the LINE STRAIGHT indicator goes out), the signal from the input jacks passes through the Balance mode and the tone control circuits and the tone quality can be adjusted using the TREBLE and BASS controls.
When the switch is depressed once again to ON position (LINE STRAIGHT indicator lights up), the signal from the input jacks is sent directly to the Power Amplifier, without passing through the balance mode and tone control circuits and a flat frequency is obtained.

⓰ SUBSONIC FILTER SWITCH

When the switch is depressed to the ON position, the subsonic filter with the 15Hz cut off frequency operates. The subsonic filter attenuates frequencies lower than 15Hz with a 6dB/oct slope, and can be used, therefore, to suppress the ultra-low range noise, which is generated by record warp and other factors. This noise cannot actually be heard by the ear, but it can cause intermodulation distortion and even damage to the speaker systems. When playing badly warped records, this switch can be used to good effect.

⓱ TAPE COPY SWITCHES

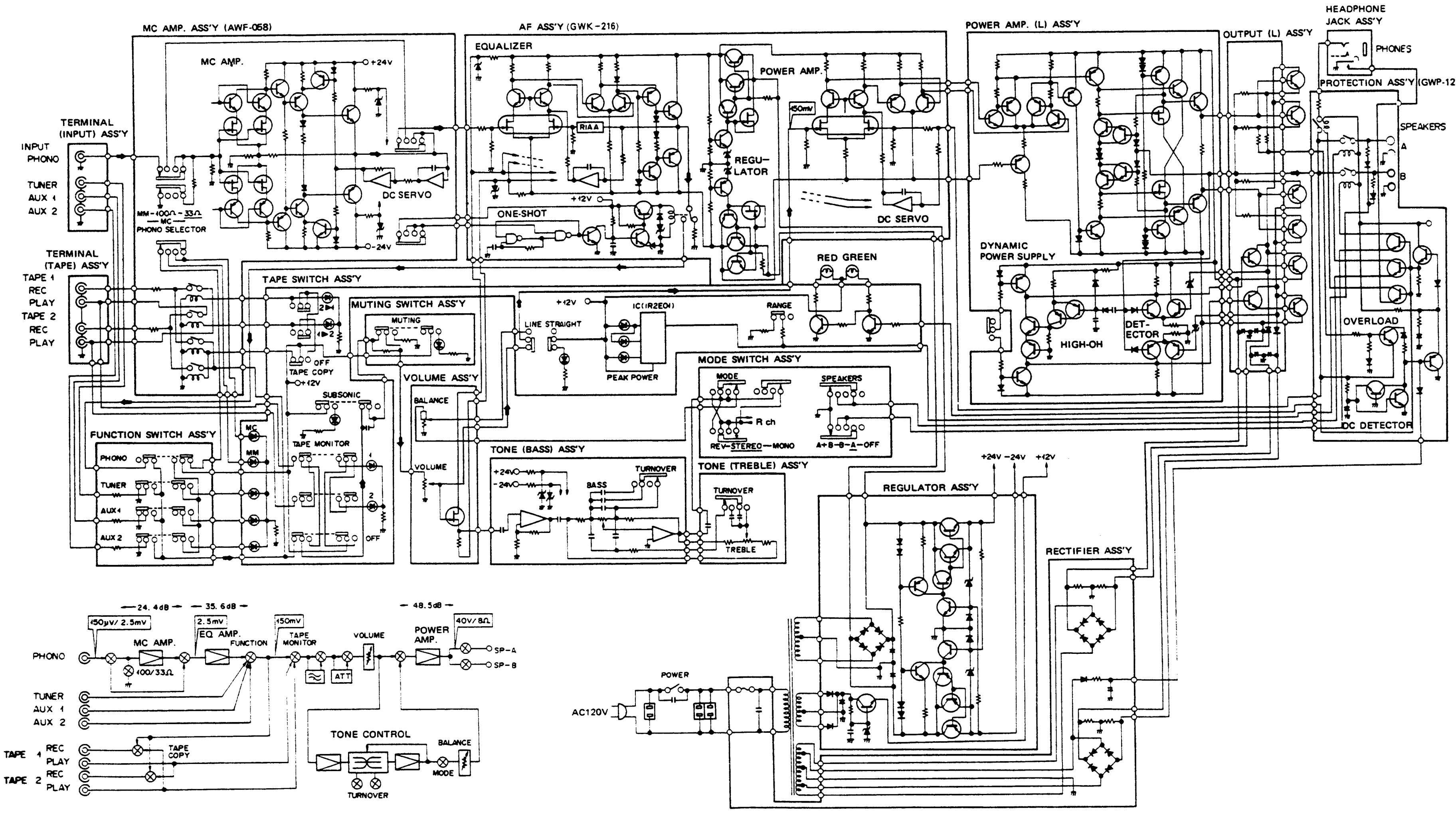
Use these switches when copying a tape, using 2 tape decks.

1 ► 2	Depress when copying a tape (recording) from tape deck 1 to 2.
2 ► 1	Depress when copying a tape (recording) from tape deck 2 to 1.
OFF	Depress when not copying. Leave in the OFF position normally.

⓲ BALANCE CONTROL

Used to adjust the balance of sound from the left and right channels. To increase the volume from the right channel, turn in a clockwise direction from the centre (↷). To increase the volume from the left channel, turn in an counter-clockwise direction from the center (↶). The control does not function if the LINE STRAIGHT switch is ON.

3. BLOCK DIAGRAM


A
B
C
D
MC AMP. ASS'Y (AWF-058)
MC AMP.
+24V
-24V
DC SERVO
MM-100Ω-33Ω
—MC—
PHONO SELECTOR
TERMINAL (INPUT) ASS'Y
INPUT
PHONO
TUNER
AUX 1
AUX 2
TERMINAL (TAPE) ASS'Y
TAPE 1
REC
PLAY
TAPE 2
REC
PLAY
TAPE SWITCH ASS'Y
2
1▶2
OFF
TAPE COPY
+12V
MUTING SWITCH ASS'Y
MUTING
SUBSONIC
VOLUME ASS'Y
BALANCE
VOLUME
FUNCTION SWITCH ASS'Y
PHONO
TUNER
AUX1
AUX 2
MC
MM
TAPE MONITOR
1
2
OFF
AF ASS'Y (GWK-216)
EQUALIZER
RIAA
+12V
ONE-SHOT
POWER AMP.
REGU-LATOR
150mV
DC SERVO
RED GREEN
+12V
IC(IR2E01)
PEAK POWER
LINE STRAIGHT
RANGE
MODE SWITCH ASS'Y
MODE
R ch
REV-STEREO—MONO
SPEAKERS
A+B-B-A-OFF
TONE (BASS) ASS'Y
+24V
-24V
TURNOVER
BASS
TONE (TREBLE) ASS'Y
TURNOVER
TREBLE
POWER AMP. (L) ASS'Y
DYNAMIC POWER SUPPLY
HIGH-OH
DET-ECTOR
OUTPUT (L) ASS'Y
HEADPHONE JACK ASS'Y
PHONES
PROTECTION ASS'Y (GWP-121)
SPEAKERS
A
B
OVERLOAD
DC DETECTOR
+24V -24V +12V
REGULATOR ASS'Y
RECTIFIER ASS'Y
POWER
AC120V
—24.4dB—
—35.6dB—
—48.5dB—
150µV/2.5mV
2.5mV
150mV
40V/8Ω
PHONO
MC AMP.
100/33Ω
EQ AMP.
FUNCTION
TAPE MONITOR
ATT
VOLUME
POWER AMP.
SP-A
SP-B
TUNER
AUX 1
AUX 2
TAPE 1
REC
PLAY
TAPE 2
REC
PLAY
TAPE COPY
TONE CONTROL
TURNOVER
MODE
BALANCE

4. CIRCUIT DESCRIPTIONS

4.1 OUTLINE OF MAIN CIRCUITS

MC Head Amplifier

This is an input-parallel positive/negative DC amplifier with DC servo controlling the stage 3 bias circuit to prevent deterioration in the signal-to-noise ratio when the signal level is very low. The amplifier gain is 24.4dB and the S-to-N ratio is 74dB (150μV input).

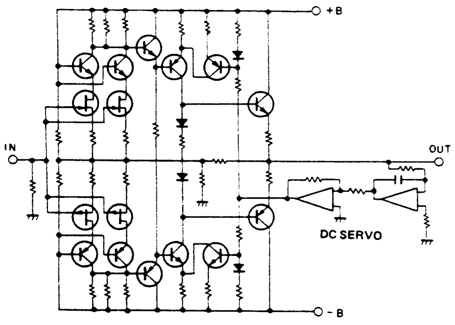

+B
IN
OUT
DC SERVO
-B

Fig. 4-1 MC head amplifier

Equalizer Amplifier

The use of an input stage FET and DC servo control has eliminated the need for input/output coupling capacitors. Amplifier gain is 35.6dB (1kHz).

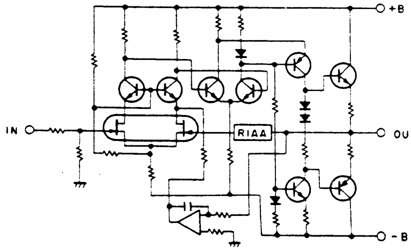

+B
IN
RIAA
OUT
-B

Fig. 4-2 Equalizer amplifier

Phono System Muting Circuit

Transient noise generated when the power is switched on and off, and the noise generated when the PHONO SELECTOR is switched are muted by a relay type muting circuit in the equalizer amplifier output (see Fig. 4-3).

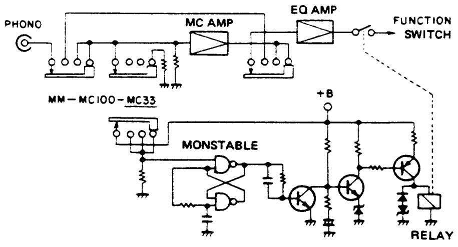

PHONO
MC AMP
EQ AMP
FUNCTION SWITCH
MM–MC100–MC33
+B
MONSTABLE
RELAY

Fig. 4-3 Phono system muting circuit

Tone Control

NFB type tone control circuit with separate 3-step switchable turnover frequencies for low and high frequency regions.

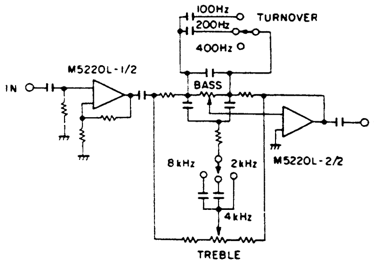

100Hz
200Hz
400Hz
TURNOVER
M5220L-1/2
IN
BASS
OUT
8kHz
2kHz
M5220L-2/2
4kHz
TREBLE

Fig. 4-4 Tone control

Line Straight Circuit

The LINE STRAIGHT switch in the A-90 simplifies the signal path by bypassing the tone control circuit, the mode switching circuit, and the balance control circuit. (See Fig. 4-5).

Power Amplifier

The A-90 features high efficiency with a dynamic power supply system, high-speed bias servo control non-switching mechanism, and a first stage FET differential input and DC servo control DC amplifier system.

The FET buffer circuit between the voltage amplifier and power amplifier stages further reduces distortion and lessens the effects due to the load. (see Fig. 4-6).

The advantages of inserting the FET buffer between stages are enumerated below.

(1) The power amplifier stage is set to constant voltage, thereby suppressing non-linearity in the hfe factor of the power transistor.

(2) High loop gain stability uneffected by changes in the load.

(3) Big reduction in the open-loop output impedance.

(4) Power transistor driven at very low impedance, thereby reducing the effects of the storage carrier, and enabling high-speed operation.

(5) With the very high load impedance at the predriver stage, distortion is minimal at high gain in this stage.

Protector Circuit

Standard protector circuit with bridge type overload detector, DC voltage detector, delayed relay action when the power is switched on, and rapid relay action when the power is switched off. Furthermore, a muting relay is also used in speaker switching. (see Fig. 4-7).

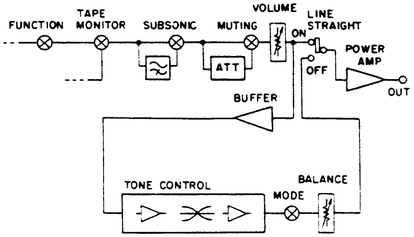

FUNCTION
TAPE MONITOR
SUBSONIC
MUTING
ATT
VOLUME
ON
LINE STRAIGHT
OFF
POWER AMP
OUT
BUFFER
TONE CONTROL
BALANCE
MODE

Fig. 4-5 LINE STRAIGHT circuit

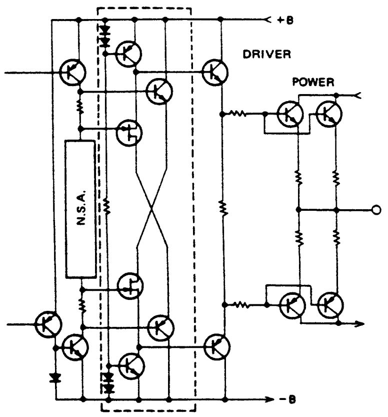

+B
DRIVER
POWER
N.S.A.
-B

Fig. 4-6 FET Buffer

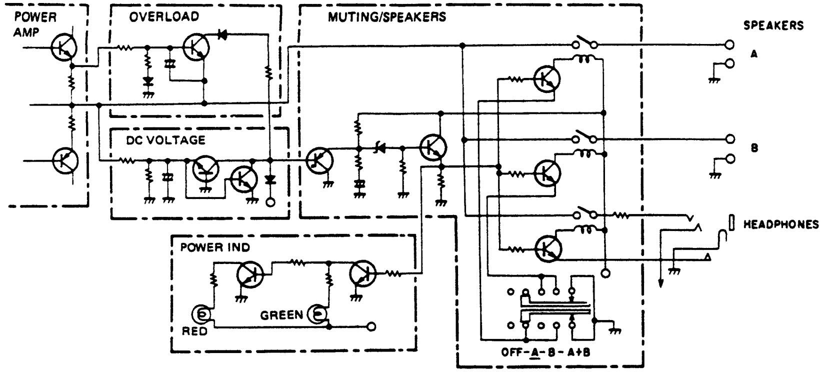

POWER AMP
OVERLOAD
MUTING/SPEAKERS
SPEAKERS
A
B
DC VOLTAGE
HEADPHONES
POWER IND
GREEN
RED
OFF-A-B-A+B

Fig. 4-7 Protector circuit

4.2 DYNAMIC POWER SUPPLY CIRCUIT

The dynamic power supply system featured in the final stage of the A-90 power amplifier varies the voltage applied to the power transistor in accordance to the signal level. The result is reduced heat loss and higher efficiency.

Operating Principles

The basic circuitry is outlined in Fig. 4-8. There are two power lines, V_H and V_L. The signal output v_a is compared with final stage power voltage v_a by differentiator, v_a being obtained by controlling V_H. With the v_a input applied to the differentiator being offset by Es (several volts), the v_a waveform is traced, v_a being several volts larger than v_o. If, however, v_o is less than V_L − Es, v_a is fixed at the V_L level (see Fig. 4-9).

The purpose of the high-region ON circuit is to avoid irregularities from occurring where v_a can no longer follow v_o at high signal frequencies, and to prevent high-speed continuous operation in the control transistor. That is, when high frequency signals appear at the output, the control transistors (Q3 and Q4) are turned fully on, and v_a is fixed at the V_H level.

A-90 Dynamic Power Supply Circuit

The overall circuit structure is outlined in Fig. 4-10. V_L is fixed so as to obtain the rated output (200W) for a 4Ω load, and the high region ON circuit is designed to operate at frequencies above 3kHz. The SPEAKER IMPEDANCE switch set to the 4Ω ~ 6Ω position fixes the power supply to the final stage transistor at the V_L level.

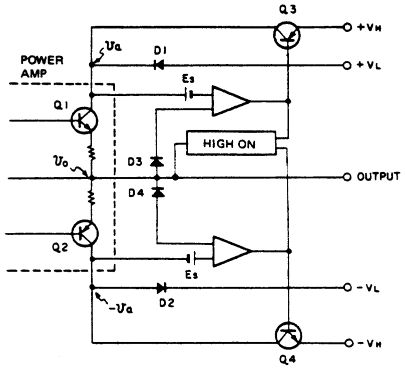

Q3
+VH
Va
D1
+VL
POWER AMP
Es
Q1
HIGH ON
Vo
D3
OUTPUT
D4
Q2
Es
D2
-Va
-VL
-VH
Q4

Fig. 4-8 Basic circuitry

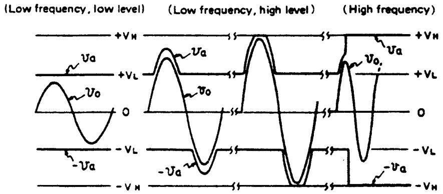


Fig. 4-9 Operating waveforms

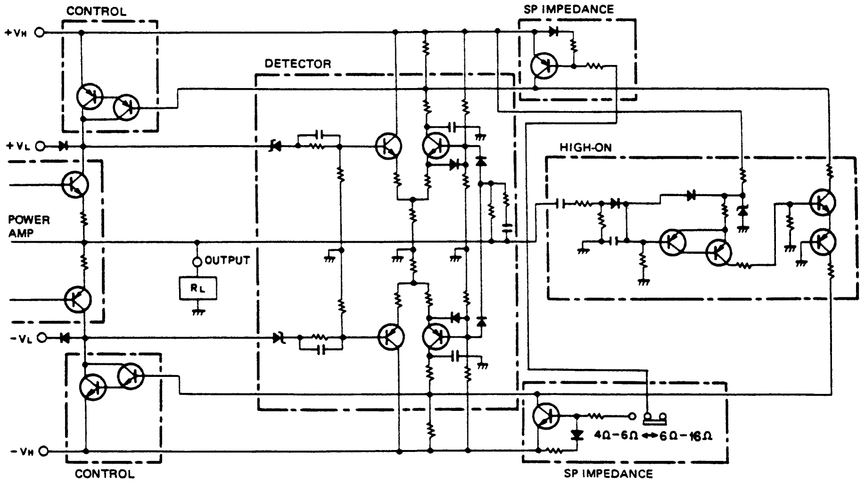

CONTROL
SP IMPEDANCE
+VH
DETECTOR
+VL
HIGH-ON
POWER AMP
OUTPUT
RL
-VL
-VH
4Ω-6Ω↔6Ω-16Ω
CONTROL
SP IMPEDANCE

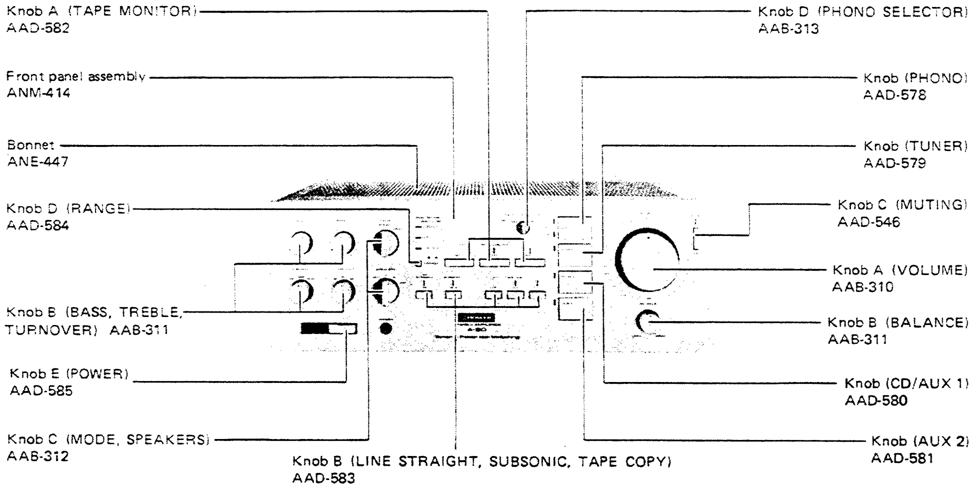
Fig. 10 Dynamic power supply circuit

5. PARTS LOCATION

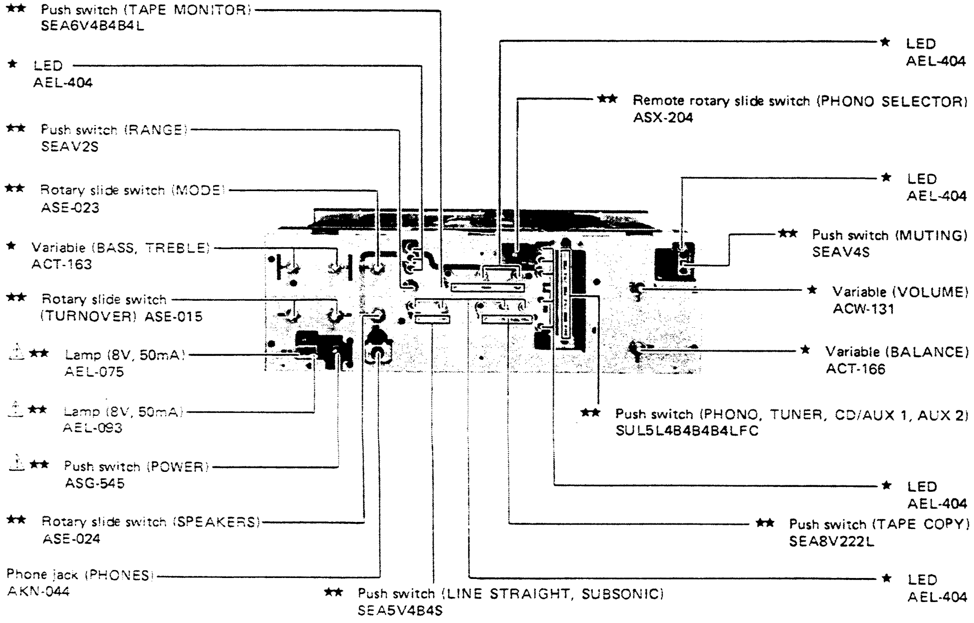
NOTES:

- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

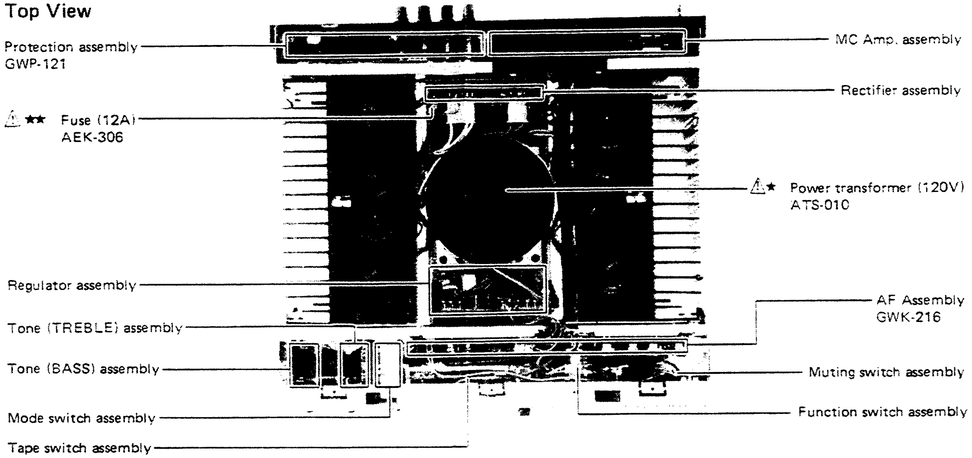
Front Panel


Knob A (TAPE MONITOR) AAD-582
Front panel assembly ANM-414
Bonnet ANE-447
Knob D (RANGE) AAD-584
Knob B (BASS, TREBLE, TURNOVER) AAB-311
Knob E (POWER) AAD-585
Knob C (MODE, SPEAKERS) AAB-312
Knob B (LINE STRAIGHT, SUBSONIC, TAPE COPY) AAD-583
Knob D (PHONO SELECTOR) AAB-313
Knob (PHONO) AAD-578
Knob (TUNER) AAD-579
Knob C (MUTING) AAD-546
Knob A (VOLUME) AAB-310
Knob B (BALANCE) AAB-311
Knob (CD/AUX 1) AAD-580
Knob (AUX 2) AAD-581

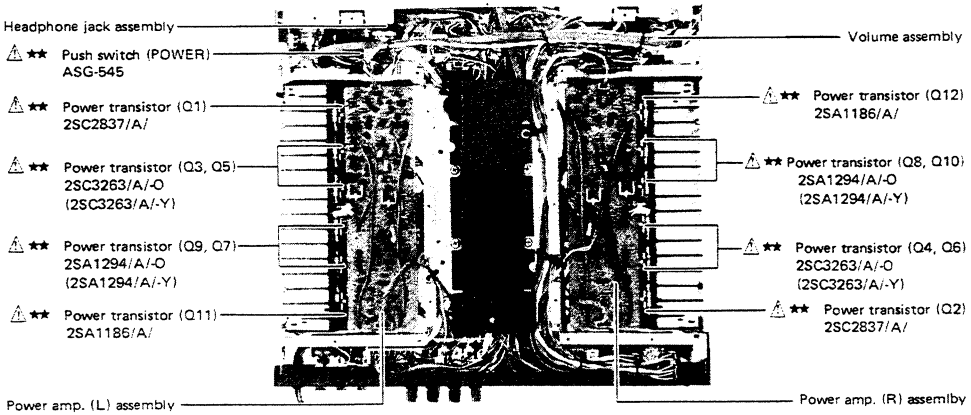
Front View


★★ Push switch (TAPE MONITOR) SEA6V4B4B4L
★ LED AEL-404
★★ Push switch (RANGE) SEAV2S
★★ Rotary slide switch (MODE) ASE-023
★ Variable (BASS, TREBLE) ACT-163
★★ Rotary slide switch (TURNOVER) ASE-015
⚠★★ Lamp (8V, 50mA) AEL-075
⚠★★ Lamp (8V, 50mA) AEL-093
⚠★★ Push switch (POWER) ASG-545
★★ Rotary slide switch (SPEAKERS) ASE-024
Phone jack (PHONES) AKN-044
★★ Push switch (LINE STRAIGHT, SUBSONIC) SEA5V4B4S
★ LED AEL-404
★★ Remote rotary slide switch (PHONO SELECTOR) ASX-204
★ LED AEL-404
★★ Push switch (MUTING) SEAV4S
★ Variable (VOLUME) ACW-131
★ Variable (BALANCE) ACT-166
★★ Push switch (PHONO, TUNER, CD/AUX 1, AUX 2) SUL5L4B4B4B4LFC
★ LED AEL-404
★★ Push switch (TAPE COPY) SEA8V222L
★ LED AEL-404

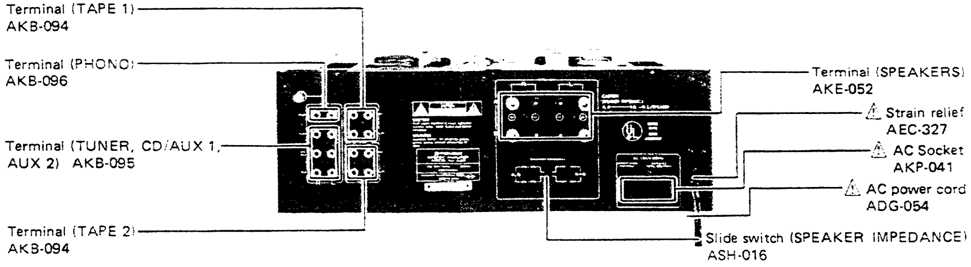
Top View


Protection assembly GWP-121
⚠★★ Fuse (12A) AEK-306
Regulator assembly
Tone (TREBLE) assembly
Tone (BASS) assembly
Mode switch assembly
Tape switch assembly
MC Amp. assembly
Rectifier assembly
⚠★ Power transformer (120V) ATS-010
AF Assembly GWK-216
Muting switch assembly
Function switch assembly

Bottom View


Headphone jack assembly
⚠★★ Push switch (POWER) ASG-545
⚠★★ Power transistor (Q1) 2SC2837/A/
⚠★★ Power transistor (Q3, Q5) 2SC3263/A/-O (2SC3263/A/-Y)
⚠★★ Power transistor (Q9, Q7) 2SA1294/A/-O (2SA1294/A/-Y)
⚠★★ Power transistor (Q11) 2SA1186/A/
Power amp. (L) assembly
Volume assembly
⚠★★ Power transistor (Q12) 2SA1186/A/
⚠★★ Power transistor (Q8, Q10) 2SA1294/A/-O (2SA1294/A/-Y)
⚠★★ Power transistor (Q4, Q6) 2SC3263/A/-O (2SC3263/A/-Y)
⚠★★ Power transistor (Q2) 2SC2837/A/
Power amp. (R) assemlby

Rear Panel

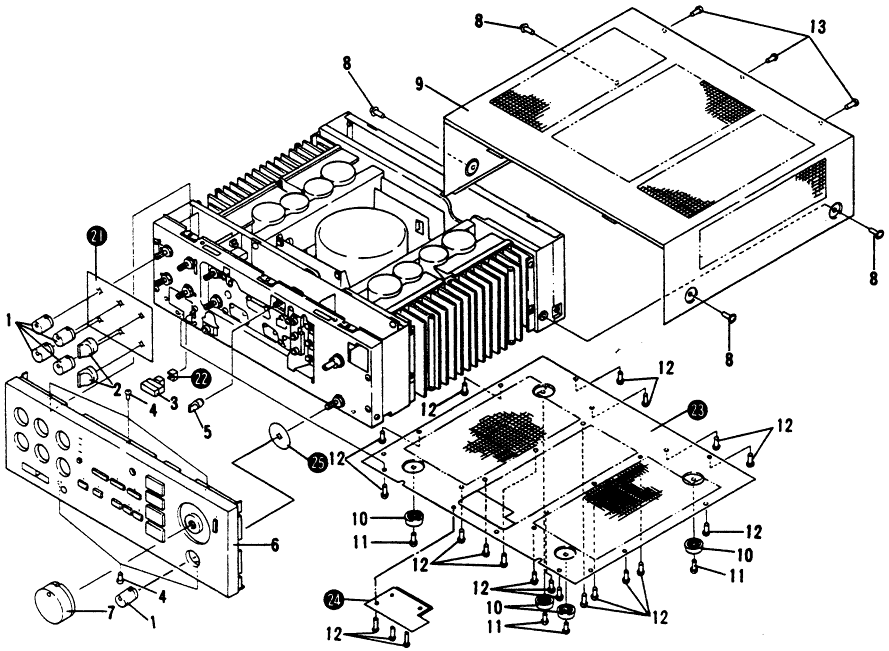

Terminal (TAPE 1) AKB-094
Terminal (PHONO) AKB-096
Terminal (TUNER, CD/AUX 1, AUX 2) AKB-095
Terminal (TAPE 2) AKB-094
Terminal (SPEAKERS) AKE-052
⚠ Strain relief AEC-327
⚠ AC Socket AKP-041
⚠ AC power cord ADG-054
Slide switch (SPEAKER IMPEDANCE) ASH-016

6. EXPLODED VIEWS AND PARTS LIST

NOTES:

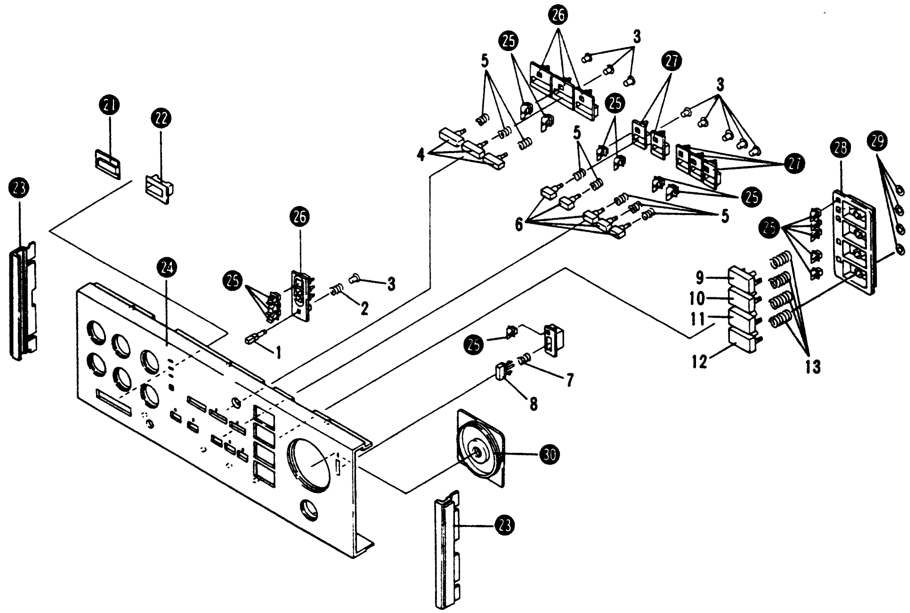
- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Exterior Components

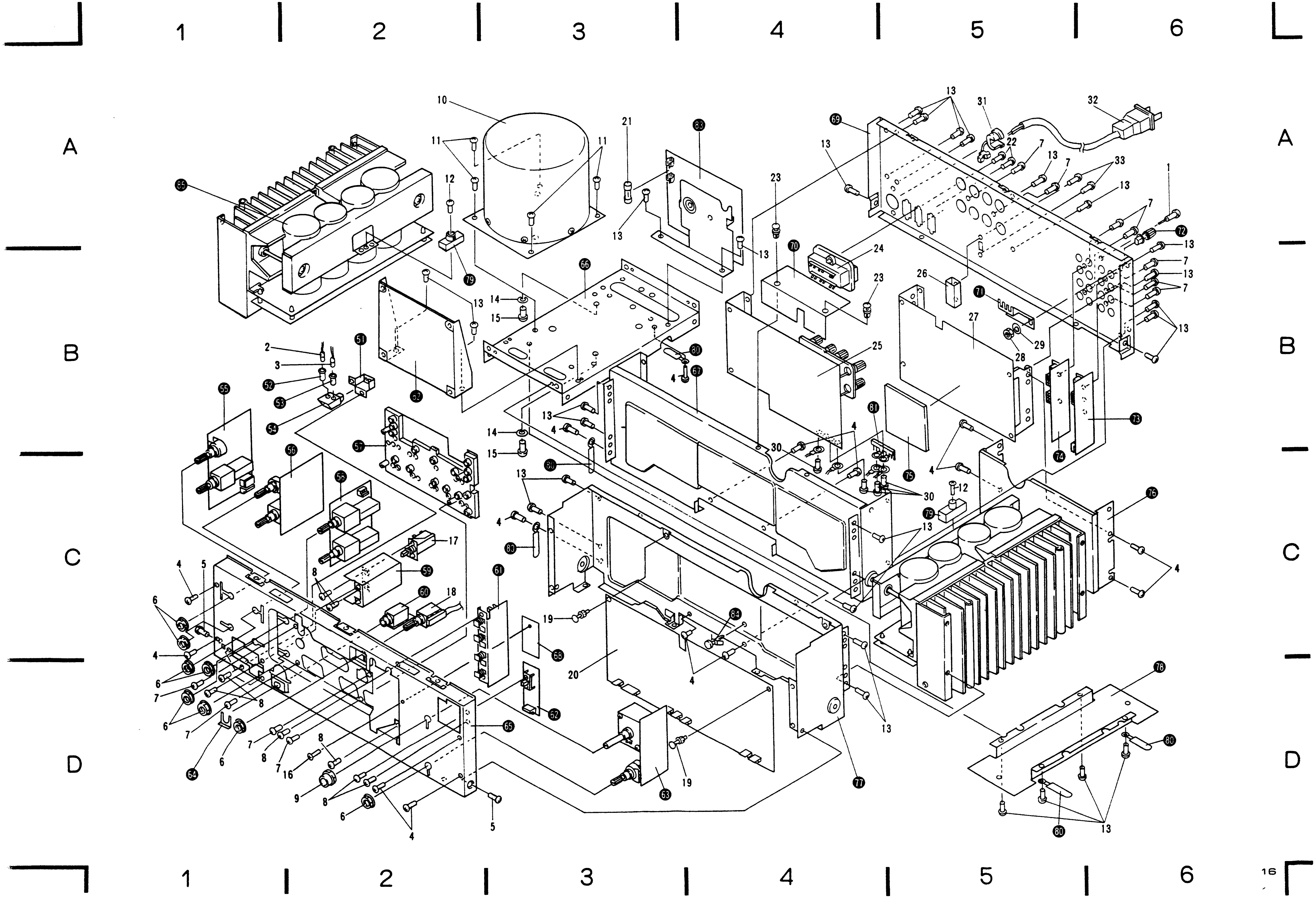


Mark	No.	Part No.	Description
	1.	AAB-311	Knob B
	2.	AAB-312	Knob C
	3.	AAD-585	Knob E
	4.	BBT30P080FZK	Screw (3 x 8)
	5.	AAB-313	Knob D
	6.	ANM-414	Front panel assembly
	7.	AAB-310	Knob A
	8.	FBT40P080FCR	Screw (4 x 8)
	9.	ANE-447	Bonnet
	10.	AEC-613	Bumper
	11.	VTZ40P080FMC	Screw (4 x 8)
	12.	ABA-140	Screw
	13.	BBT30P080FZK	Screw (3 x 8)
	21.		Masking sheet A
	22.		Flexible ring
	23.		Bottom plate
	24.		Sub bottom plate
	25.		Masking sheet

Front Panel Assembly (ANM-414)



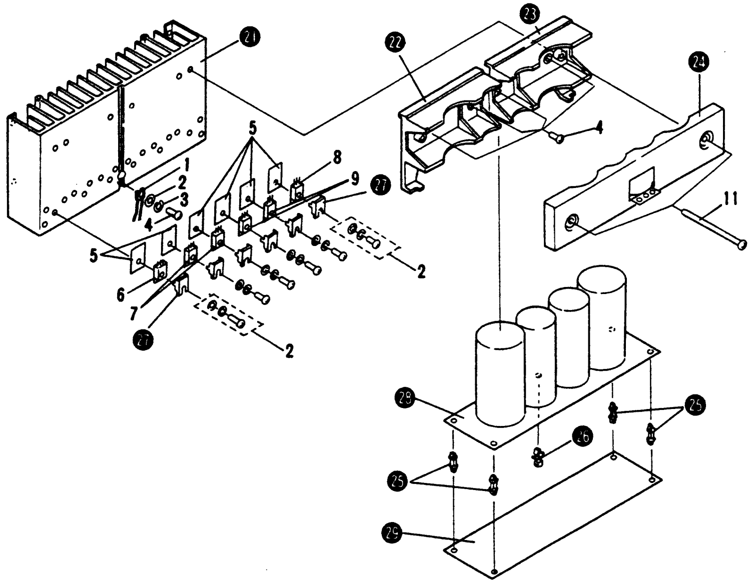
Mark	No.	Part No.	Description
	1.	AAD-584	Knob D
	2.	ABH-102	Spring
	3.	AEC-936	Stopper A
	4.	AAD-582	Knob A
	5.	ABH-099	Spring
	6.	AAD-583	Knob B
	7.	ABH-091	Spring
	8.	AAD-546	Knob C
	9.	AAD-578	Knob (PHONO)
	10.	AAD-579	Knob (TUNER)
	11.	AAD-580	Knob (CD/AUX 1)
	12.	AAD-581	Knob (AUX 2)
	13.	ABH-100	Spring
	21.		POWER indicator lens
	22.		Spacer E
	23.		Side panel
	24.		Front panel
	25.		Indicator lens
	26.		Spacer A
	27.		Spacer B
	28.		Spacer
	29.		Stopper B
	30.		VL spacer


A
B
C
D

Mark	No.	Part No.	Description
	1.	ABA-176	Screw
⚠ ★★	2.	AEL-075	Lamp (white lead)
⚠ ★★	3.	AEL-093	Lamp (black lead)
	4.	VBT30P080FZK	Screw (3 x 8)
	5.	CBZ30P080FZK	Screw (3 x 8)
	6.	ABN-048	Nut
	7.	BBT30P100FZK	(Screw 3 x 10)
	8.	BMZ30P060FZK	(Screw 3 x 6)
	9.	ABN-028	Nut
⚠ ★	10.	ATS-010	Power transformer (120V)
	11.	VTZ40P080FZK	Screw (4 x 8)
	12.	VBZ30P100FZK	Screw (3 x 10)
	13.	BBT30P080FZK	Screw (3 x 8)
	14.	WS50FMC	Washer
	15.	BMZ50P100FMC	Screw (5 x 10)
	16.	VBT30P080FZK	Screw (3 x 8)
⚠ ★★	17.	ASG-545	Push switch (POWER)
★★	18.	ASX-204	Remote rotary switch
	19.	AEC-384	Rivet
	20.	GWK-216	AF assembly
⚠ ★★	21.	AEK-306	Fuse (12A)
	22.	MTZ30P100FKZ	Screw (3 x 10)
	23.	AEC-471	Rivet
⚠	24.	AKP-041	AC socket
	25.	GWP-121	Protection assembly
	26.	ASH-016	Slide switch
	27.	AWF-058	MC amp. assembly
	28.	B71-010	Nut
	29.	WG70FUC	Washer
	30.	PMZ30P060SAD	Screw (3 x 6)
⚠	31.	AEC-327	Strain relief
⚠	32.	ADG-054	AC power cord
	33.	VMT30P060FZK	Screw (3 x 6)

Mark	No.	Part No.	Description
	51.		Rubber holder
	52.		Lamp cap (green)
	53.		Lamp cap (red)
	54.		Lamp holder A
	55.		Tone (BASS) assembly
	56.		Tone (TREBLE) assembly
	57.		Tape switch assembly
	58.		Mode switch assembly
	59.		Power switch holder
	60.		Headphone jack assembly
	61.		Function switch assembly
	62.		Muting switch assembly
	63.		Volume assembly
	64.		Mounting plate
	65.		Panel stay
	66.		Transformer frame
	67.		Rear frame
	68.		Servo regulator assembly
	69.		Rear panel
	70.		Shielding plate
	71.		Grounding terminal
	72.		Terminal (GND)
	73.		Terminal (INPUT) assembly
	74.		Terminal (TAPE) assembly
	75.		Cushion
	76.		Shielding case
	77.		Front frame
	78.		Wire guide
	79.		Terminal
	80.		Binder
	81.		Grounding plate
	82.		Regulator assembly
	83.		Rectifier assembly
	84.		Spacer
	85.		Heat sink assembly

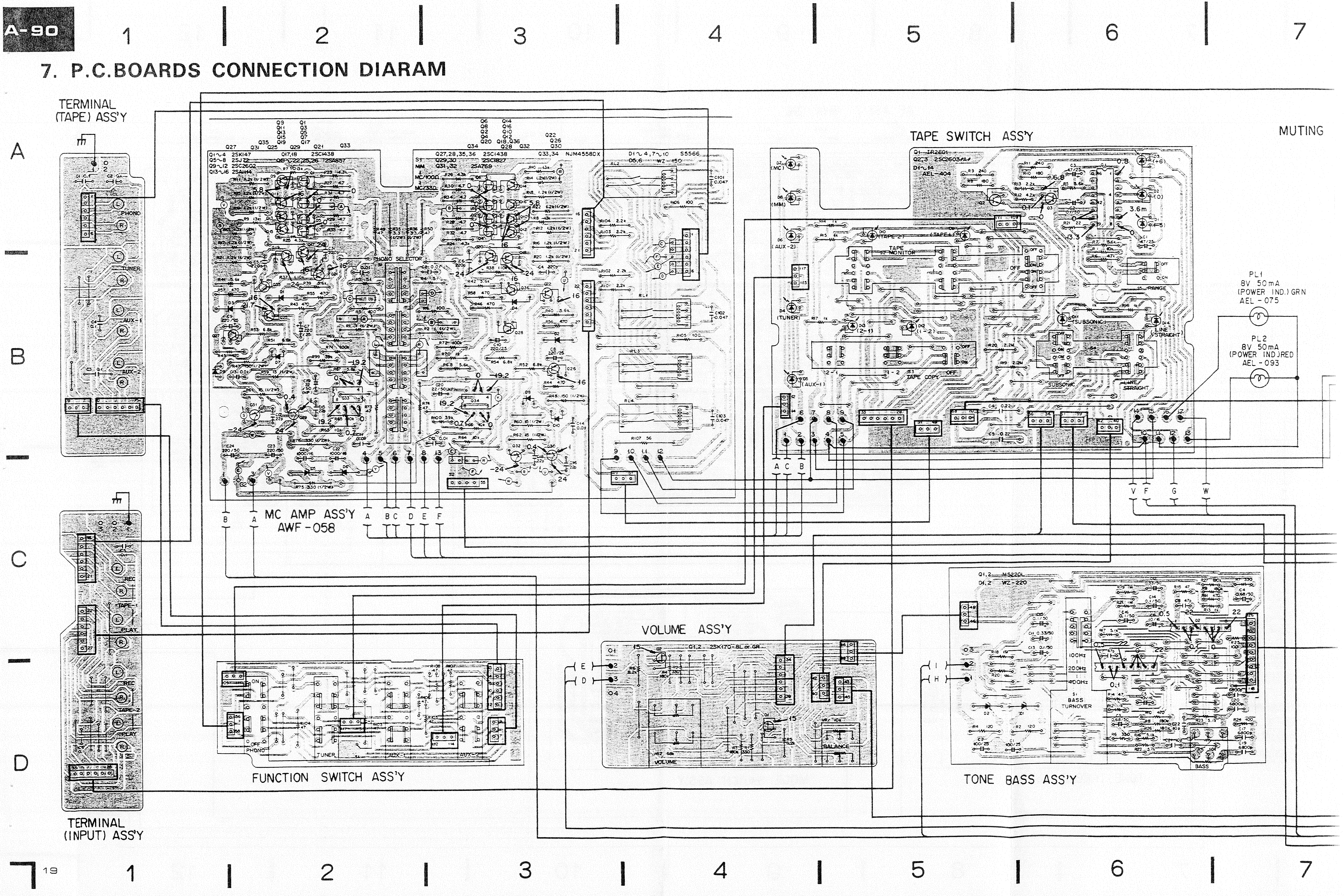
Heat Sink Assembly

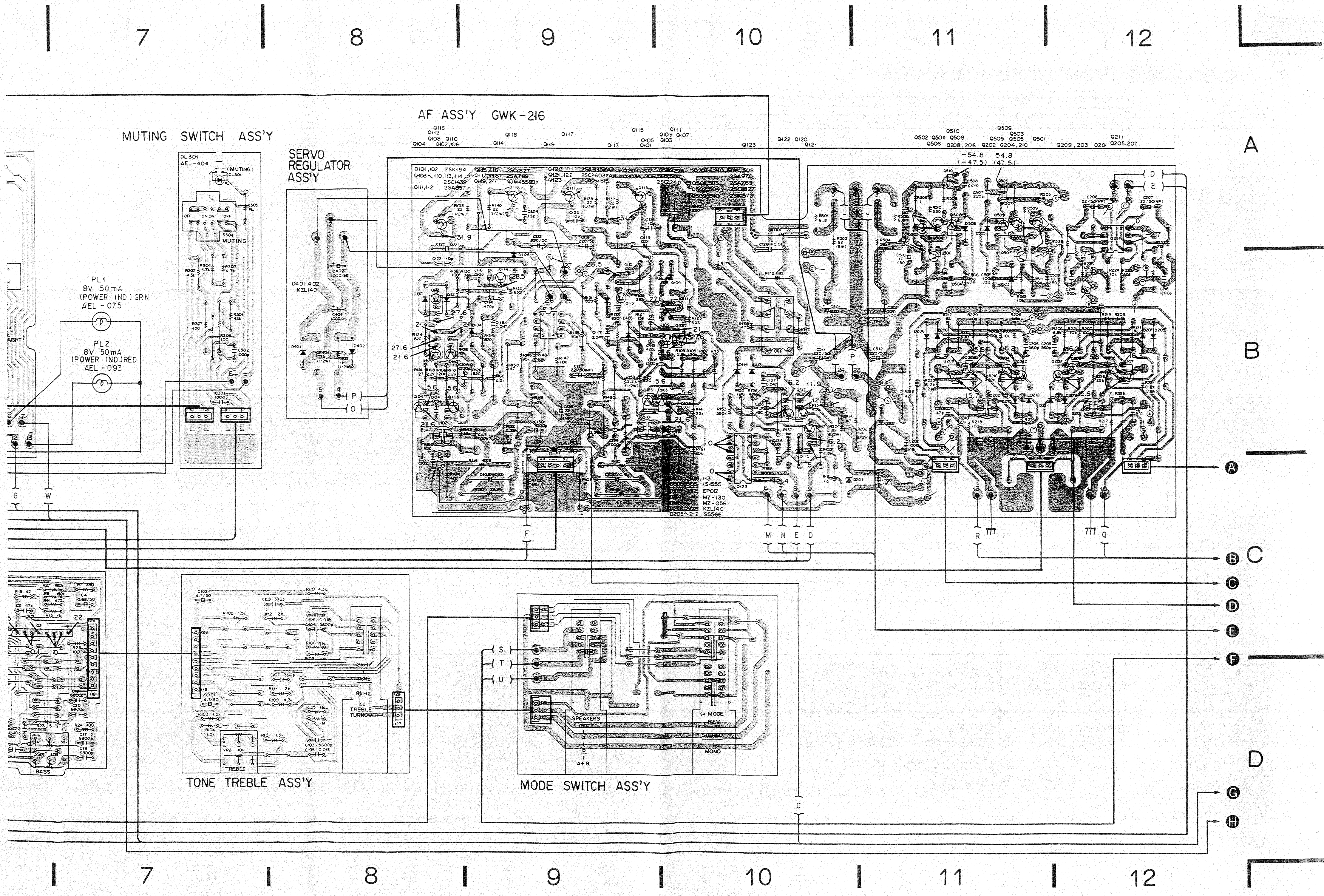


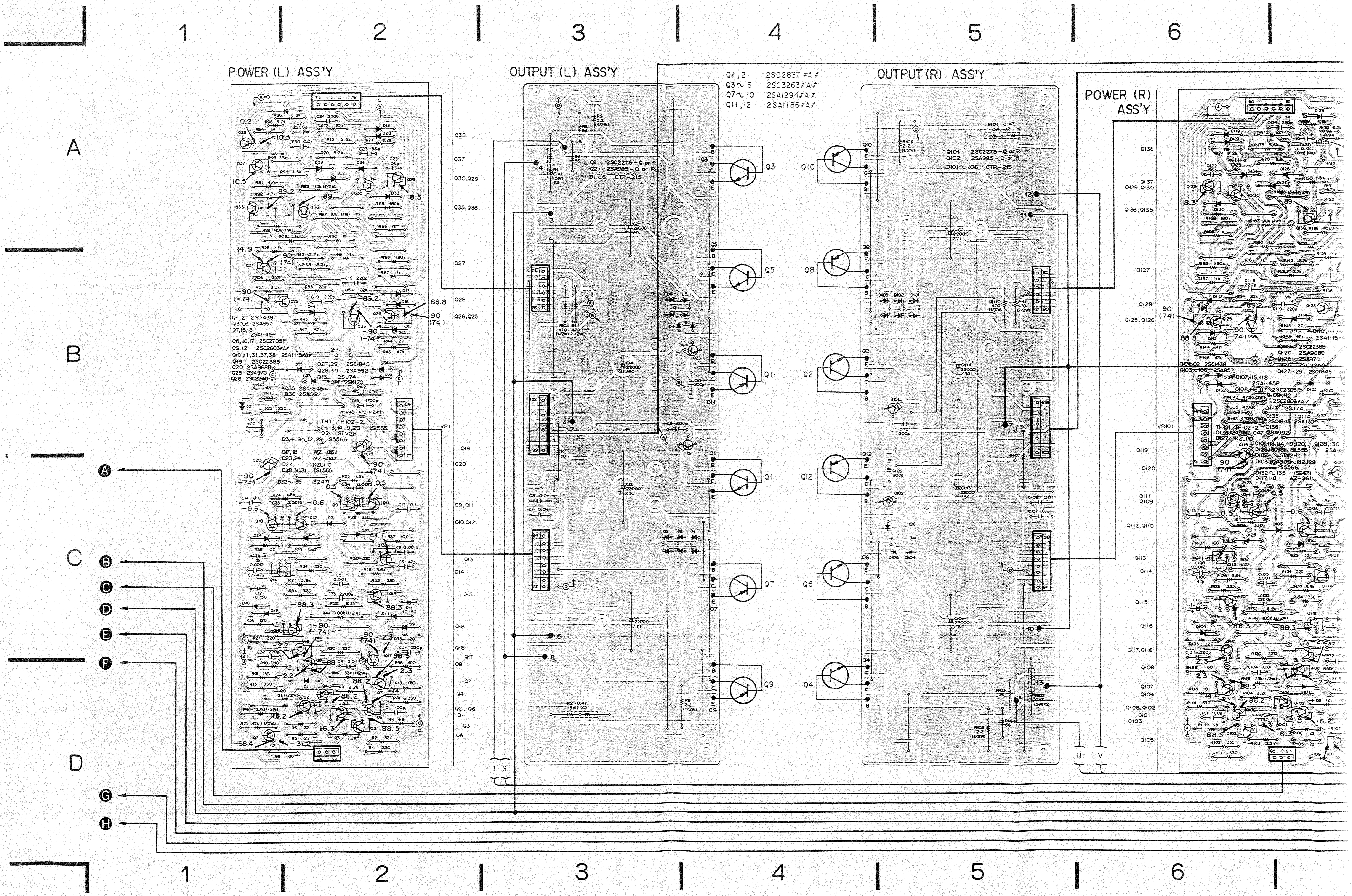
Mark	No.	Part No.	Description
★	1.	STV2H	Varistor (Part of 29)
	2.	ABA-276	Screw
	3.	....	
	4.	VBZ30P100FZK	Screw (3 x 10)
	5.	AEC-818	Insulator
⚠ ★★	6.	2SC2837/A/	Power transistor
⚠ ★★	7.	2SC3263/A/-O* (2SC3263/A/-Y*)	Power transistor
⚠ ★★	8.	2SA1294/A/-O* (2SA1294/A/-Y*)	Power transistor
⚠ ★★	9.	2SA1186/A/	Power transistor
	11.	PMZ40P800FZB	Screw (4 x 80)
	21.		Heat sink
	22.		Capacitor holder B
	23.		Capacitor holder A
	24.		Capacitor holder C
	25.		PCB holder
	26.		Spacer
	27.		Transistor holder
	28.		Output (L) assembly (L ch) Output (R) assembly (R ch)
	29.		Power amp. (L) assembly (L ch) Power amp. (R) assembly (R ch)

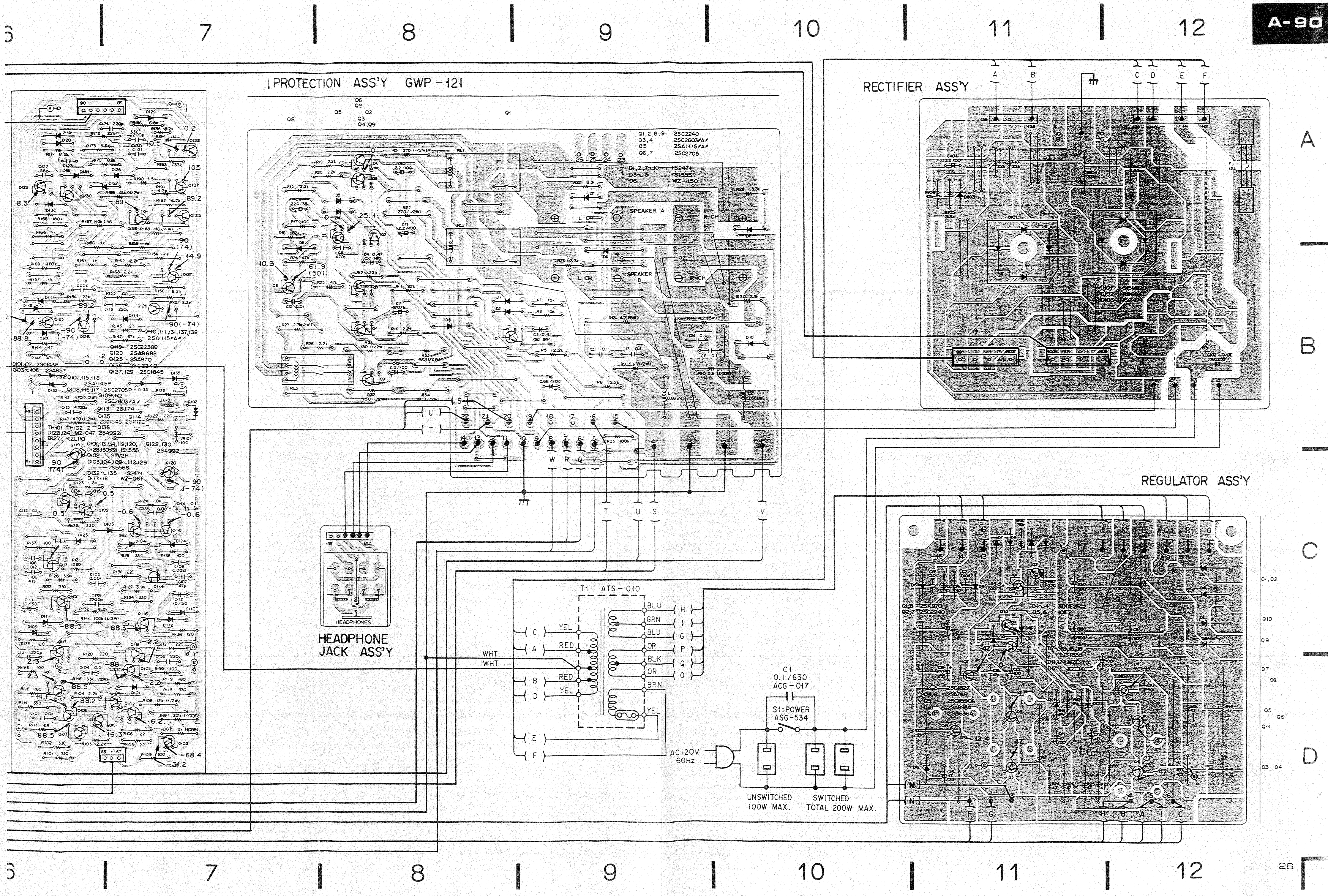
*hfe must have the same value.

7. P.C.BOARDS CONNECTION DIARAM


1
2
3
4
5
6
7
A
B
C
D
TERMINAL (TAPE) ASS'Y
PHONO
TUNER
AUX-1
AUX-2
Q1∼4 2SK147
Q5∼8 2SJ72
Q9∼12 2SC2602
Q13∼16 2SA1144
Q17,18 2SC1438
Q19∼22,25,26 2SA837
Q27,28,35,36 2SC1438
Q29,30 2SC1827
Q31,32 2SA769
Q33,34 NJM4558DX
D1∼4,7∼10 S5566
D5,6 WZ-150
PHONO SELECTOR
MC AMP ASS'Y
AWF-058
TAPE SWITCH ASS'Y
Q1 IR2E01
Q2,3 2SC2603
D1∼4 AEL-404
TAPE MONITOR
TAPE COPY
SUBSONIC
LINE STRAIGHT
MUTING
PL1
8V 50mA
(POWER IND.) GRN
AEL-075
PL2
8V 50mA
(POWER IND.)RED
AEL-093
TERMINAL (INPUT) ASS'Y
REC
TAPE-1
PLAY
TAPE-2
FUNCTION SWITCH ASS'Y
PHONO
TUNER
AUX
VOLUME ASS'Y
Q1,2 2SK170-BL or GR
VOLUME
BALANCE
TONE BASS ASS'Y
Q1,2 M5220L
D1,2 WZ-220
BASS TURNOVER
100Hz
200Hz
400Hz
BASS
A
B
C
D
E
F
G
V
W
H
I

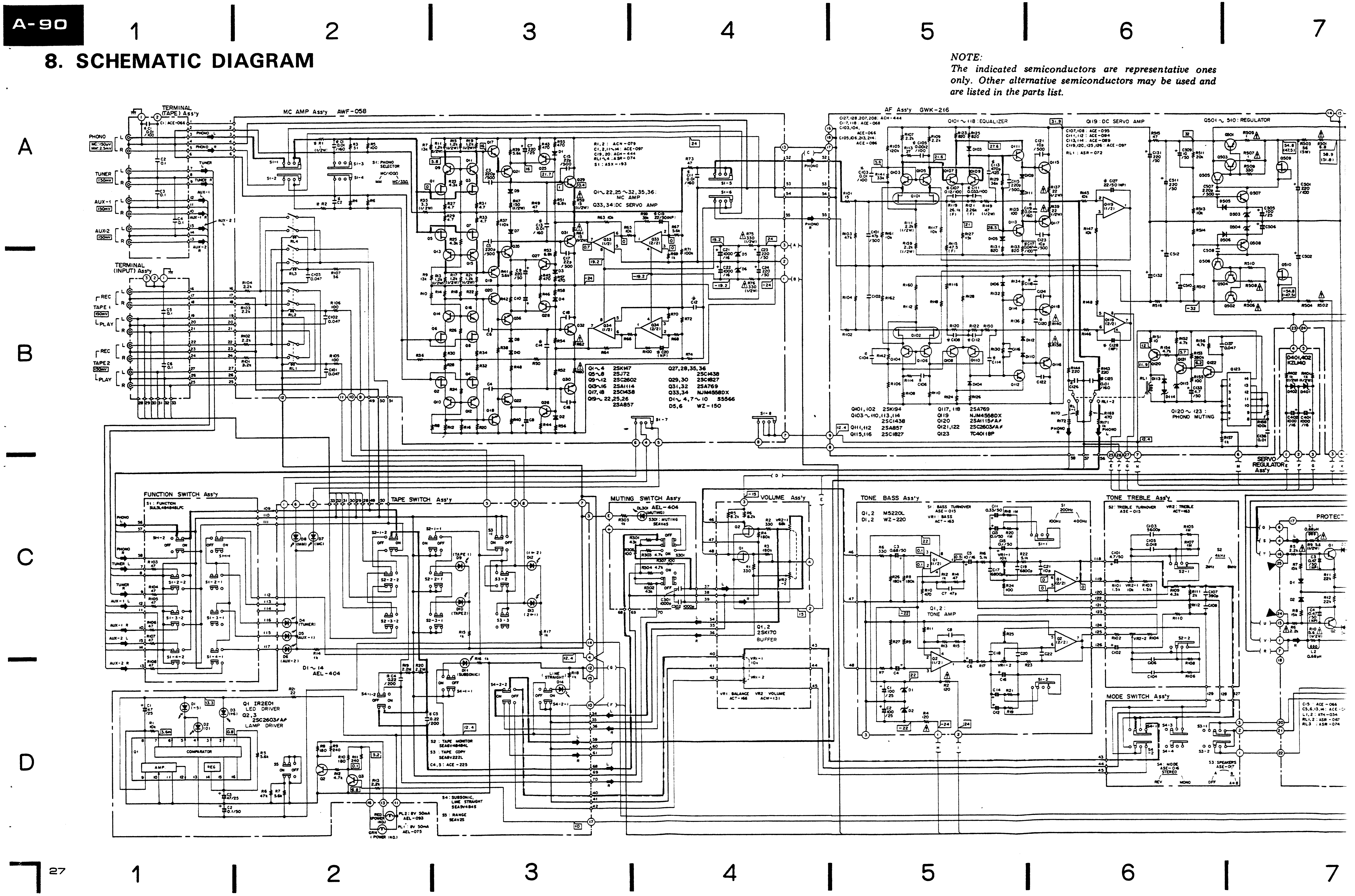

7
8
9
10
11
12
A
B
C
D
MUTING SWITCH ASS'Y
DL301
AEL-404
(MUTING)
MUTING
SERVO REGULATOR ASS'Y
D401,402 KZL140
AF ASS'Y GWK-216
Q101,102 2SK194
Q103~110,113,114 2SC1438
Q111,112 2SA857
Q115,116 2SC1827
Q117,118 2SA769
Q119,211 NJM4558DX
Q120
Q121,122 2SC2603
Q123 TC4014BP
2SC2240
PL1
8V 50mA
(POWER IND.) GRN
AEL-075
PL2
8V 50mA
(POWER IND.) RED
AEL-093
-54.8
(-47.5)
54.8
(47.5)
D101~106,113, 1S1555
EPO12
MZ-130
MZ-056
KZL140
D205~212 S5566
TONE TREBLE ASS'Y
TREBLE
S2 TREBLE TURNOVER
2kHz
4kHz
8kHz
BASS
MODE SWITCH ASS'Y
SPEAKERS
OFF
A+B
S4 MODE
REV
STEREO
MONO
G
W
F
M
N
E
D
R
Q
P
O
S
T
U
C
Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Ⓕ
Ⓖ
Ⓗ


1
2
3
4
5
6
A
B
C
D
POWER (L) ASS'Y
OUTPUT (L) ASS'Y
Q1, 2 2SC2837 ≠A≠
Q3～6 2SC3263≠A≠
Q7～10 2SA1294≠A≠
Q11, 12 2SA1186≠A≠
OUTPUT (R) ASS'Y
POWER (R) ASS'Y
Q1 2SC2275-Q or R
Q2 2SA985-Q or R
D1～6 CTP-215
Q101 2SC2275-Q or R
Q102 2SA985-Q or R
D101～106 CTP-215
Q3
Q5
Q11
Q1
Q7
Q9
Q10
Q8
Q2
Q12
Q6
Q4
Q38
Q37
Q30, Q29
Q35, Q36
Q27
Q28
Q26, Q25
VR1
Q19
Q20
Q9, Q11
Q10, Q12
Q13
Q14
Q15
Q16
Q18
Q17
Q8
Q7
Q4
Q2, Q6
Q1
Q3
Q5
Q138
Q137
Q129, Q130
Q136, Q135
Q127
Q128
Q125, Q126
VR101
Q119
Q120
Q111
Q109
Q112, Q110
Q113
Q114
Q115
Q116
Q117, Q118
Q108
Q107
Q104
Q106, Q102
Q101
Q103
Q105
A
B
C
D
E
F
G
H
T
S
U
V
Q1, 2 2SC1438
Q3～6 2SA857
Q7, 15, 18 2SA1145P
Q8, 16, 17 2SC2705P
Q9, 12 2SC2603≠A≠
Q10, 11, 31, 37, 38 2SA1115≠A≠
Q19 2SC2238B
Q20 2SA968B
Q25 2SA970
Q26 2SC2240
Q27, 29 2SC1845
Q28, 30 2SA992
Q13 2SJ74
Q14 2SK170
Q35 2SC1845
Q36 2SA992
TH1 TH102-2
D1, 13, 14, 19, 20 1S1555
D2 STV2H
D3, 4, 9～12, 29 S5566
D17, 18 WZ-061
D23, 24 MZ-047
D27 KZL110
D28, 30, 31 1S1555
D32～35 1S2471
0.2
10.5
89.2
-89
8.3
14.9
90
(74)
-90
(-74)
88.8
89.2
0.5
-0.6
-88.3
88.3
2.3
2.2
16.2
16.3
88.5
88.2
14.1
-68.4
-31.2
R2 0.47 (5W) X2
C14 22000 /50
C13 22000 /50
C11 22000 /71
C12 22000 /71
R101 0.47 (5W) X2
C102 22000 /71
C114 22000 /50
C113 22000 /50
C101 22000 /71
VR101
Q101, 102 2SC1438
Q103～106 2SA857
Q107, 115, 118 2SA1145P
Q108, 116, 117 2SC2705P
Q109, 112 2SC2603≠A≠
Q119 2SC2238B
Q120 2SA968B
Q125 2SA970
Q126 2SC2240
Q127, 129 2SC1845
Q128, 130 2SA992
Q113 2SJ74
Q114 2SK170
Q135 2SC1845
Q136 2SA992
TH101 TH102-2
D101, 113, 114, 119, 120 1S1555
D102 STV2H
D103, 104, 109～112, 129 S5566
D123, 124 MZ-047
D127 KZL110
D128, 130, 131 1S1555
D132～135 1S2471
D117, 118 WZ-061

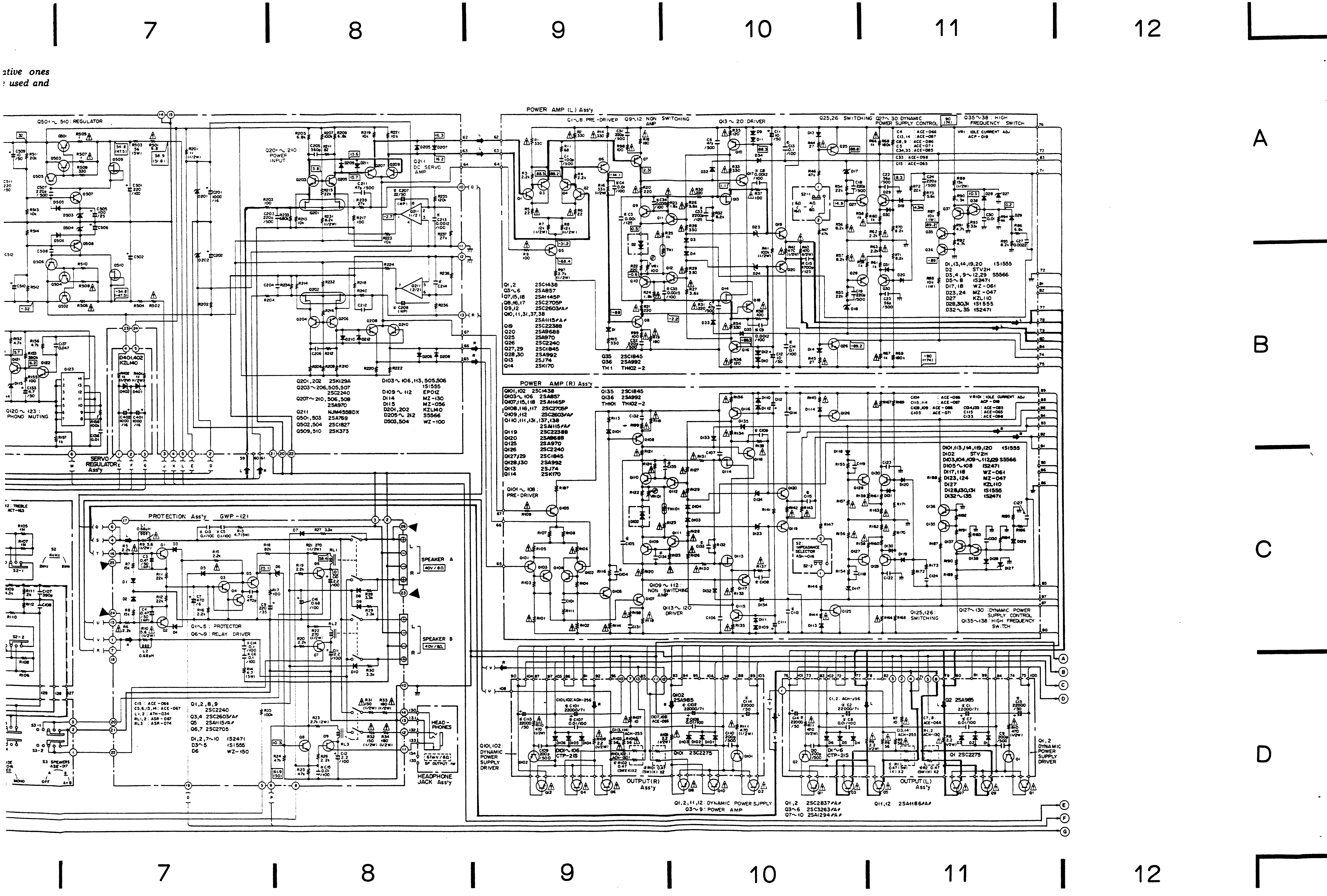

PROTECTION ASS'Y GWP-121
Q1,2,8,9 2SC2240
Q3,4 2SC2603/A/
Q5 2SA1115/A/
Q6,7 2SC2705
D1~2,7~10 1S2471
D3~5 1S1555
D6 WZ-150
SPEAKER A
SPEAKER B
L CH
R CH
RECTIFIER ASS'Y
REGULATOR ASS'Y
HEADPHONE JACK ASS'Y
HEADPHONES
T1 ATS-010
YEL
RED
WHT
BLU
GRN
OR
BLK
BRN
C1
0.1/630
ACG-017
S1:POWER
ASG-534
AC120V
60Hz
UNSWITCHED
100W MAX.
SWITCHED
TOTAL 200W MAX.
6
7
8
9
10
11
12
A
B
C
D

8. SCHEMATIC DIAGRAM

NOTE:
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.


1
2
3
4
5
6
7
A
B
C
D
TERMINAL (TAPE) Ass'y
C1 : ACE-066
PHONO
MC:150μV
MM:2.5mV
TUNER
150mV
AUX-1
150mV
AUX-2
150mV
TERMINAL (INPUT) Ass'y
REC
TAPE 1
150mV
PLAY
REC
TAPE 2
150mV
PLAY
MC AMP Ass'y AWF-058
S1 : PHONO SELECTOR
MM
MC/100Ω
MC/33Ω
R1, 2 : ACN-079
C1, 2, 11~14 : ACE-097
C19, 20 : ACH-444
RL1~4 : ASR-074
S1 : ASX-193
Q1~22, 25~32, 35, 36 : MC AMP
Q33, 34 : DC SERVO AMP
Q1~4 2SK147
Q5~8 2SJ72
Q9~12 2SC2602
Q13~16 2SA1114
Q17, 18 2SC1438
Q19~22, 25, 26 2SA857
Q27, 28, 35, 36 2SC1438
Q29, 30 2SC1827
Q31, 32 2SA769
Q33, 34 NJM4558DX
D1~4, 7~10 S5566
D5, 6 WZ-150
AF Ass'y GWK-216
C127, 128, 207, 208 : ACH-444
C117, 118 : ACE-068
C103, 104, ACE-066
C105, 106, 213, 214 : ACE-086
Q101~118 : EQUALIZER
Q119 : DC SERVO AMP
C107, 108 : ACE-095
C111, 112 : ACE-094
C113, 114 : ACE-089
C119, 120, 125, 126 : ACE-097
RL1 : ASR-072
Q501~510 : REGULATOR
Q101, 102 2SK194
Q103~110, 113, 114 2SC1438
Q111, 112 2SA857
Q115, 116 2SC1827
Q117, 118 2SA769
Q119 NJM4558DX
Q120 2SA1115/A/
Q121, 122 2SC2603/A/
Q123 TC4011BP
Q120~123 : PHONO MUTING
PHONO L
PHONO R
SERVO REGULATOR Ass'y
FUNCTION SWITCH Ass'y
S1 : FUNCTION SUL5L4848LFC
TAPE SWITCH Ass'y
D1~14 AEL-404
MUTING SWITCH Ass'y
DL301 AEL-404 (MUTING)
S301 : MUTING SEAV45
VOLUME Ass'y
VR1 BALANCE ACT-166
VR2 VOLUME ACW-131
Q1, 2 2SK170 BUFFER
Q1 IR2E01 LED DRIVER
Q2, 3 2SC2603/A/ LAMP DRIVER
COMPARATOR
AMP
REG
S2 : TAPE MONITOR SEA8V4848L
S3 : TAPE COPY SEA8V2222L
C4, 5 : ACE-225
S4 : SUBSONIC, LINE STRAIGHT SEA5V4845
S5 : RANGE SEAV25
PL2 : 8V 50mA AEL-093
PL1 : 8V 50mA AEL-075
RED (POWER IND.)
GRN (POWER IND.)
TONE BASS Ass'y
Q1, 2 M5220L
D1, 2 WZ-220
S1 BASS TURNOVER ASE-015
VR1 : BASS ACT-163
Q1, 2 : TONE AMP
TONE TREBLE Ass'y
S2 : TREBLE TURNOVER ASE-015
VR2 : TREBLE ACT-163
MODE SWITCH Ass'y
S4 : MODE ASE-016
REV STEREO MONO
S3 : SPEAKERS ASE-017
OFF A A+B
PROTECT
C15 ACE-066
C5, 6, 13, 14 : ACE-
L1, 2 : ATH-034
RL1, 2 : ASR-067
RL3 : ASR-074

ative ones
used and


7
8
9
10
11
12
A
B
C
D
Q501 ~ 510 : REGULATOR
Q201 ~ 210 POWER INPUT
Q211 DC SERVO AMP
POWER AMP (L) Ass'y
C1~8 PRE-DRIVER
Q9~12 NON SWITCHING AMP
Q13 ~ 20 : DRIVER
Q25,26 SWITCHING
Q27 ~ 30 DYNAMIC POWER SUPPLY CONTROL
Q35 ~ 38 : HIGH FREQUENCY SWITCH
VR1 : IDLE CURRENT ADJ
Q120 ~ 123 : PHONO MUTING
SERVO REGULATOR Ass'y
POWER AMP (R) Ass'y
Q101 ~ 108 : PRE-DRIVER
Q109 ~ 112 NON SWITCHING AMP
Q113 ~ 120 DRIVER
Q125,126 : SWITCHING
Q127 ~ 130 : DYNAMIC POWER SUPPLY CONTROL
Q135 ~ 138 : HIGH FREQUENCY SWITCH
PROTECTION Ass'y GWP-121
Q1 ~ 5 : PROTECTOR
Q6 ~ 9 : RELAY DRIVER
SPEAKER A 40V/8Ω
SPEAKER B 40V/8Ω
HEADPHONES
HEADPHONE JACK Ass'y
SP OUTPUT 67mV/8Ω
S2 : IMPEDANCE SELECTOR
S3 SPEAKERS ASE-017
OFF
A+B
MONO
OUTPUT(R) Ass'y
OUTPUT(L) Ass'y
Q101,102 : DYNAMIC POWER SUPPLY DRIVER
Q1,2 DYNAMIC POWER SUPPLY DRIVER
Q1,2,11,12 : DYNAMIC POWER SUPPLY
Q3 ~ 9 : POWER AMP
Q1,2 2SC2837
Q3~6 2SC3263
Q7~10 2SA1294
Q11,12 2SA1186
Q2 2SA985
Q1 2SC2275
Q102 2SA985
Q101 2SC2275

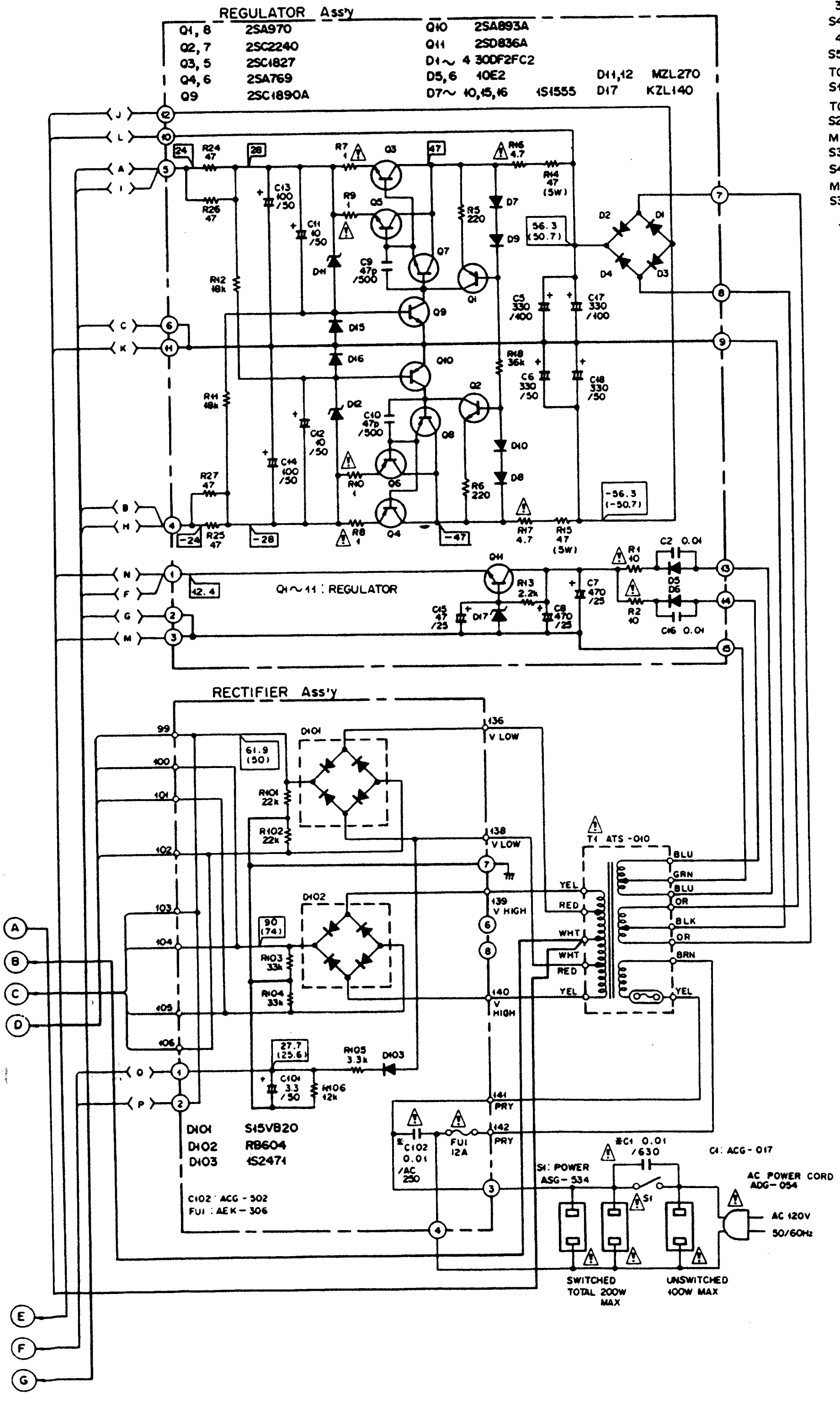
1. **RESISTORS.**
   Indicated in Ω, ¼W, ⅛W,±5% tolerance unless otherwise noted k; kΩ, M; MΩ, (F); ±1%, (G); ±2%, (K); ±10%, (M); ±20% tolerance
2. **CAPACITORS:**
   Indicated in capacity (µF)/voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.
3. **VOLTAGE CURRENT.**
   V ; Signal voltage at (200 W+ 200W, 8Ω)output (1kHz)
   ; DC voltage (V) at no input signal
   Value in ( ) is DC voltage at rated power.
4. **OTHERS:**
   ➡ ; Signal route.
   ⊘ ; Adjusting point.
   The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
   ✱ marked capacitors and resistors have parts numbers.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

SWITCHES:

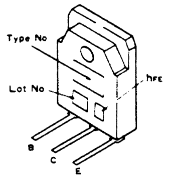
OUTSIDE OF PC BOARD	
S1: POWER	ON - OFF
S2: IMPEADANCE SELECTOR	4∼6Ω - 6∼16Ω
MC AMP Ass'y	
S1: PHONO SELECTOR	MC/33Ω - MC/100Ω - MM
FUNCTION SWITCH Ass'y	
S1-1 : FUNCTION PHONO	ON - OFF
1-2 : FUNCTION TUNER	ON - OFF
1-3 : FUNCTION AUX1	ON - OFF
1-4 : FUNCTION AUX2	ON - OFF
TAPE SWITCH Ass'y	
S2-1 : TAPE MONITOR OFF	ON - OFF
2-2 : TAPE MONITOR 1	ON - OFF
2-3 : TAPE MONITOR 2	ON - OFF
S3-1 : TAPE COPY OFF	ON - OFF
3-2 : TAPE COPY 1►2	ON - OFF
3-3 : TAPE COPY 2►2	ON - OFF
S4-1 : SUBSONIC	ON - OFF
4-2 : LINE STRAIGHT	ON - OFF
S5 : RANGE	ON - OFF
TONE BASS Ass'y	
S1: BASS TURNOVER	100Hz - 200Hz - 400Hz
TONE TREBLE Ass'y	
S2: TREBLE TURNOVER	2kHz - 4kHz - 8kHz
MODE SWITCH Ass'y	
S3: SPEAKERS	OFF-A-B-A+B
S4: MODE	REV-STEREO-MONO
MUTING SWITCH Ass'y	
S301 : MUTING(-20dB)	ON - OFF

The underlined indicates the switch position.


REGULATOR Ass'y
Q1, 8 2SA970
Q2, 7 2SC2240
Q3, 5 2SC1827
Q4, 6 2SA769
Q9 2SC1890A
Q10 2SA893A
Q11 2SD836A
D1∼4 30DF2FC2
D5, 6 10E2
D7∼10,15,16 1S1555
D11,12 MZL270
D17 KZL140
Q1∼11 : REGULATOR
56.3 (50.7)
-56.3 (-50.7)
42.4
R14 47 (5W)
R15 47 (5W)
RECTIFIER Ass'y
D101 S15VB20
D102 RB604
D103 1S2471
C102 : ACG - 502
FU1 : AEK - 306
61.9 (50)
90 (74)
27.7 (25.6)
V LOW
V HIGH
PRY
T1 ATS-010
BLU
GRN
OR
BLK
BRN
YEL
RED
WHT
FU1 12A
C1 0.01 /630
C1: ACG - 017
S1: POWER ASG-534
AC POWER CORD ADG-054
AC 120V
50/60Hz
SWITCHED TOTAL 200W MAX
UNSWITCHED 100W MAX

External Appearances of Transistors and IC's

2SC2837/A/
2SC3263/A/
2SA1294/A/
2SA1186/A/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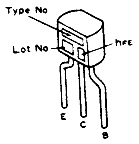
Lot No
hFE
B
C
E

2SA1115/A/
2SC2603/A/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E
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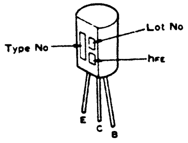
B

2SA992
2SC1845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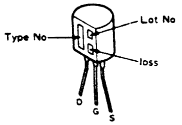
2SK170
2SJ74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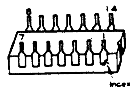
D
G
S

TC4011BP


8
14
7
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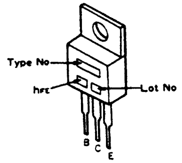
Index

2SC2275
2SA985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Lot No
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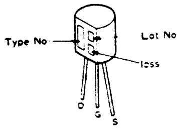
C
E

2SK147
2SJ72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D
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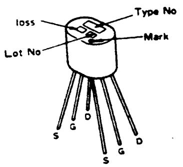
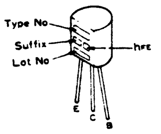
S

2SK129A


Idss
Type No
Mark
Lot No
S
G
D
S
G
D

2SC1890A
2SA893A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Suffix
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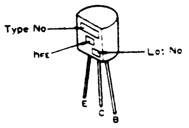
E
C
B

2SA857
2SC1438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E
C
B

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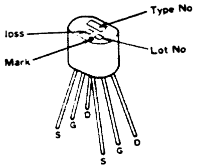
Idss
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Lot No
Mark
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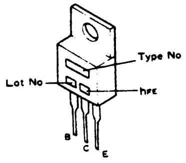
G
D
S
G
D

2SA769
2SC1827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C
E

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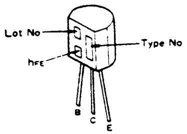
2SC2602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C
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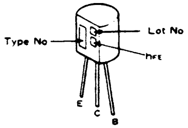
2SC2240
2SA970
2SC2705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C
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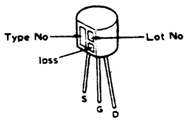
2SK373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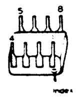
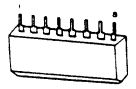
D

NJM4558DX



M5220L



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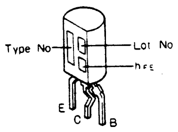
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C
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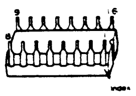
1R2E01


9
16
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Index

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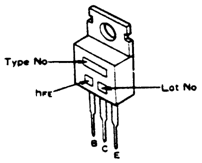
2SC2238B
2SD836A


Type No
hFE
Lot No
B
C
E

9. ELECTRICAL PARTS LIST

NOTES:

- ***When ordering resistors, first convert resistance values into code form as shown in the following examples.***

  Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

  560Ω 56 x 10¹ 561 .... RD¼PS $\boxed{5}\boxed{6}\boxed{1}$ *J*
  47kΩ 47 x 10³ 473 .... RD¼PS $\boxed{4}\boxed{7}\boxed{3}$ *J*
  0.5Ω 0R5 .... RN2H $\boxed{0}\boxed{R}\boxed{5}$ *K*
  1Ω 010 .... RS1P $\boxed{0}\boxed{1}\boxed{0}$ *K*

  Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

  5.62kΩ 562 x 100 5621......... RN¼SR $\boxed{5}\boxed{6}\boxed{2}\boxed{1}$ *F*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*

  ★★ GENERALLY MOVES FASTER THAN ★.

  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Miscellaneous Parts List

P.C. BOARD ASSEMBLIES

Mark	Part No.	Symbol & Description
	AWF-058	MC amp. assembly
	GWK-216	AF assembly
	GWP-121	Protection assembly
	AWH-121	Power amp. assembly
	non supply	Power amp (L) assembly
	non supply	Power amp (R) assembly
	AWR-244	Power supply assembly
	non supply	Rectifier assembly
	non supply	Regulator assembly
	AWR–243	Output assembly
	non supply	Output (L) assembly
	non supply	Output (R) assembly
	AWS-160	Switch assembly
	non supply	Tape switch assembly
	non supply	Function switch assembly
	AWG-088	Tone control assembly
	non supply	Tone (BASS) assembly
	non supply	Tone (TREBLE) assembly
	non supply	Mode switch assembly
	non supply	Headphone jack assembly
	non supply	Muting switch assembly
	non supply	Servo regulator assembly
	non supply	Terminal (TAPE) assembly
	non supply	Terminal (INPUT) assembly
	non supply	Volume assembly

SEMICONDUCTORS

Mark	Part No	Symbol & Description
⚠ ★★	2SC2837/A/	Q1, Q2
⚠ ★★	2SC3263/A/-O* (2SC3263/A/-Y*)	Q3 – Q6
⚠ ★★	2SA1294/A/-O* (2SA1294/A/-Y*)	Q7 – Q10
⚠ ★★	2SA1186/A/	Q11, Q12

*hfe must have the same value.

SWITCHES

Mark	Part No.	Symbol & Description	
⚠ ★★	ASG-545	S1	Push switch (POWER)
★★	ASH-016	S2	Slide switch (IMPEDANCE)
★★	ASX-204	Remote slide switch	

OTHERS

Mark	Part No.	Symbol & Description	
⚠ ★★	AEK-306	FU1	Fuse (15A)
⚠ ★★	AEL-075	PL1	Lamp (8V, 50mA)
⚠ ★★	AEL-093	PL2	Lamp (8V, 50mA)
⚠ ★	ATS-010	T1	Power transformer (120V)
⚠	ACG-017	C1	Ceramic (0.01/630V)
⚠	AKP-041	AC socket	
⚠	ADG-054	AC power cord	
⚠	AEC-327	Strain relief	

Regulator Assembly

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	2SA970	Q1, Q8
★★	2SA769	Q4, Q6
★★	2SC2240	Q2, Q7
★★	2SC1827	Q3, Q5
★★	2SC1890A	Q9
★★	2SA893A	Q10
★★	2SD836A	Q11
★	KZL140	D17
⚠ ★	10E2	D5, D6
⚠ ★	30DF2FC-2	D1 – D4
★	MZL 270	D11, D12
★	1S1555 (US1035)	D7 – D10, D15, D16

CAPACITORS

Mark	Part No.	Symbol & Description
	CEYA 100M 50	C7, C8
	CEXA 101M 50	C9, C10
	CEXA 331M 100	C1, C2, C3, C4
	CMA 470J 500	C5, C6
	CKDYB 103K 50	C11, C12
	CEA 470M 25L	C15
	CEA 471M 25L	C13, C14

RESISTORS

Note: *When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

Mark	Part No.	Symbol & Description
⚠	RD1/4PMFL100J	R1, R2
	RT5B 470K	R14, R15
	RDH1/4P470J	R24 – R27
⚠	RFA1/4PS4R7J	R16, R17
⚠	RD1/4PMF010J	R7 – R10
	RD1/4PM □□□ J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
	VBZ30P080FZK	Screw (3 x 8)

Power amp. (L) Assembly

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★	1S1555	D1, D13, D14, D19, D20, D28, D30, D31
★	S5566	D3, D4, D9 – D12, D29
★	1S2471	D32 – D35
★	MZ-047	D23, D24
★	WZ-061	D17, D18
★	STV2H	D2
★	KZL110	D27
★★	2SK170	Q14
★★	2SJ74	Q13
★★	2SC1845	Q27, Q29, Q35
★★	2SA992	Q28, Q30, Q36
★★	2SA1145P	Q7, Q15, Q18
★★	2SC2705P	Q8, Q16, Q18
★★	2SA1115/A/	Q10, Q11, Q13, Q38
★★	2SC2603/A/	Q9, Q12
★★	2SC2240-BL	Q26
★★	2SA970	Q25
★★	2SC1438	Q1, Q2
★★	2SA857	Q3 – Q6
★★	2SA968B	Q20
★★	2SC2238B	Q19
★★	TH102-2	TH1

CAPACITORS

Mark	Part No.	Symbol & Description
	CEYA 100M 25	C11, C12
	ACE-066	C4 Mylar (0.01/100V)
	ACE-067	C13, C14 Mylar (0.1/100V)
	ACE-086	C8, C9 Mylar (0.0012/100V)
	ACE-071	C5 Polystrene (1000p/125V)
	CMA 470J 500	C6, C7
	CMA 221J 500	C18, C19, C24, C31, C32
	CMA 101J 500	C1
	ACE-085	C34, C35 Mylar (0.0015/100V)
	ACE-098	C33 Polystrene (2200p/125V)
	ACE-065	C15 Polystrene (4700p/125V)
	CQMA 222K 50	C27
	CQMA 103K 50	C30
	CCDSL 560K 500	C22, C23

RESISTORS

Note: *When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

Mark	Part No.	Symbol & Description
⚠	ACP-019	VR1 Semi-fixed (100)
⚠	RF1/4PS □□□ J	R9, R18 – R21, R30, R31, R33 – R38, R44, R45, R98, R99
⚠	RF1/2PS □□□ J	R42, R43
	RS IP 103J	R87, R88
⚠	RD1/4PMFL □□□ J	R1, R2, R5, R6, R14, R66, R67
⚠	RD1/4PMF □□□ J	R23–R29, R32, R56–R59 R62, R63
	RD1/2PS □□□ J	R7, R8, R16, R41, R89, R97
	RD1/4PM □□□ J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
	VBZ30P080FMC	Screw (3 x 8)

Output (R) Assembly

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	2SC2275	Q101
★★	2SA985	Q102
★	CTP-21S	D101 – D106

CAPACITORS

Mark	Part No.	Symbol & Description
	ACH-256	C101, C102 Electrolytic (22000/71V)
	ACH-255	C113, C114 Electrolytic (22000/50V)
	ACE-066	C107, C108 Mylar (0.01/100V)
	CMA 201J 500	C109, C110

RESISTORS

Note: *When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

Mark	Part No.	Symbol & Description
	ACN-130	R101, R102 Wire wound (0.47/5W x 2)
⚠	RF1/4PS □□□ J	R105 – R107
⚠	RF1/2PS □□□ J	R108 – R111

OTHERS

Mark	Part No.	Symbol & Description
	PMZ30P060BKi	Screw (3 x 6)

Tone (BASS) Assembly

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	M5220L	Q1, Q2
★	WZ-220	D1, D2

SWITCHES

Mark	Part No.	Symbol & Description
★★	ASE-015	S1 Rotary slide switch (BASS TURNOVER)

CAPACITORS

Mark	Part No.	Symbol & Description
	CEA 101M 25L	C1, C2
	CEANL R68M 50	C3, C4
	CEANL 100M 16	C5, C6
	CEANL 0R1M 50	C13 – C16
	CEANL R33M 50	C11, C12
	CQMA 682J 50	C17, C20
	CCDSL 100D 50	C21, C22
	CCDSL 470J 50	C7, C8

RESISTORS

Note: *When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

Mark	Part No.	Symbol & Description
★	ACT-163	VR1 Volume (100k, BASS)
⚠	RD1/4PMFL □□□ J	R2, R4
	RD1/8PM □□□ J	Other resistors

Muting Switch Assembly

Mark	Part No.	Symbol & Description
★	AEL-404	D301 (LED Red)
★★	SEAV4S	S301 Push switch (MUTING)
	CQSA 102J 50	C301, C302
	RD1/4PM □□□ J	R301 – R307

Mode Switch Assembly

Mark	Part No.	Symbol & Description
★★	ASE-024	S3 Rotary slide switch (SPEAKERS)
★★	ASE-023	S4 Rotary slide switch (MODE)

Headphone Jack Assembly

Mark	Part No.	Symbol & Description
	AKN-044	Phone jack (PHONES)

Function Switch Assembly

Mark	Part No.	Symbol & Description
★★	SUL5L4B4B4B4LFC	Push switch (FUNCTION)
	RD1/8PM470J	R103 – R108

Terminal (INPUT) Assembly

Mark	Part No.	Symbol & Descripton
	ACE-066	C1 Mylar (0.01/100V)
	CQMLA 104K 50	C2 – C4
	AKB-096	Terminal (PHONO)
	AKB-095	Terminal (TUNER, AUX)

Tone (TREBLE) Assembly

SWITCHES

Mark	Part No.	Symbol & Description
★★	ASE-015	S2 Rotary slide switch (TREBLE TURNOVER)

CAPACITORS

Mark	Part No.	Symbol & Description
	CEANL 4R7M 50	C101, C102
	CQMA 562J 50	C103, C104
	CQMA 183J 50	C105, C106
	CKDYB 391K 50	C107, C108

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
★	ACT-163	VR2 Volume (10k, TREBLE)
	RD1/8PM ○○○J	R101 – R112

Volume Assembly

Mark	Part No.	Symbol & Description
★★	2SK170	Q1, Q2
★	ACT-166	VR1 Volume (10k, BALANCE)
★	ACW-131	VR2 Volume (68k, VOLUME)
	RD1/4PM □□□ J	R1 – R6

Terminal (TAPE) Assembly

Mark	Part No.	Symbol & Description
	CQMLA 104K 50	C5, C6
	AKB-094	Terminal (TAPE)

Protection Assembly (GWP-121)

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	2SC2240	Q1, Q2, Q8, Q9
★★	2SC2705	Q6, Q7
★★	2SC2603/A/	Q3, Q4
★★	2SA1115/A/	Q5
★	1S2471	D1, D2, D7 – D10
★	1S1555 (1S2076)	D3 – D5
★	WZ-150	D6

CAPACITORS

Mark	Part No.	Symbol & Description
	ACE-066	C15 Mylar (0.01/100V)
	ACE-067	C5, C6, C13, C14 Mylar (0.1/100V)
	CEANP R47M 50	C3, C4
	CEA 2R2M 100L	C10 – C12
	CEA 471M 6L	C7
	CEA 221M 35L	C9
	CEA R68M 100L	C16
	CKDYB 471K 50	C8

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
⚠	RD1/2PSF5R6J	R9, R10
	RS2P272J	R23
	RT5B4R7K	R13, R14
⚠	RD1/2PSF151F	R31 – R34
⚠	RD1/4PMF222J	R5, R6, R15
	RD1/2PS271J	R21, R22
	RD1/4PM □□□ J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
★★	ASR-067	RL1, RL2 Relay
★★	ASR-074	RL3 Relay
	ATH-034	L1, L2 AF choke coil
	AKE-052	Terminal (SPEAKERS)
	VBZ30P080FZK	Screw (3 x 8)
	PMZ30P060SAD	Screw (3 x 6)

Rectifier Assembly

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
⚠ ★	S15VB20	D101
⚠ ★	RB604	D102
★	IS2471	D103

CAPACITORS

Mark	Part No.	Symbol & Description
	CEA 3R3M 50L	C101
⚠	ACG-502	C102 Ceramic (0.01/AC 125V)

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	RD1/4PM □□□ J	R101 – R106

OTHERS

Mark	Part No.	Symbol & Description
	VBZ30P200FZK	Screw (3 x 20)

Output (L) Assembly

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	2SC2275	Q1
★★	2SA985	Q2
★	CTP-21S	D1 – D6

CAPACITORS

Mark	Part No.	Symbol & Description
	ACH-256	C1, C2 Electrolytic (22000/71V)
	ACH-255	C13, C14 Electrolytic (22000/50V)
	ACE-066	C7, C8 Mylar (0.01/100V)
	CMA 201J 500	C9, C10

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	ACN-130	R1, R2 Wire wound (0.47/5W x 2)
⚠	RF1/4PS □□□ J	R5 – R7
⚠	RF1/2PS □□□ J	R8 – R11

OTHERS

Mark	Part No.	Symbol & Description
	PMZ30P060BKi	Screw (3 x 6)

MC amp. Assembly (AWF-058)

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	2SK147-V1	Q1 – Q4
★★	2SJ72-V2	Q5 – Q8
★★	2SA857	Q19 – Q22, Q25, Q26
★★	2SA769	Q31, Q32
★★	2SA1114	Q13 – Q16
★★	2SC1438	Q17, Q18, Q27, Q28, Q35, Q36
★★	2SC1827	Q29, Q30
★★	2SC2602	Q9 – Q12
★★	NJM4558DX	Q33, Q34
★	S5566	D1 – D4, D7 – D10
★	WZ-150	D5, D6

CAPACITORS

Mark	Part No.	Symbol & Description
	ACE-097	C1, C2, C11 – C14 Polystyrene (0.01/160V)
	ACH-444	C19, C20 Electrolytic (2.2/50V, NP)
	CEXA 102M 16	C21, C22
	CEYA 221M 25	C7 – C10
	CEXA 221M 50	C23, C24
	CKDYF 473Z 50	C101, C103
	CMA 220J 500	C15 – C18
	CMA 221J 500	C3 – C6

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	ACN-079	R1, R2 Carbon (1/1/2W)
	RDH1/4P □□□ J	R49, R50, R73, R74
⚠	RD1/2PSF □□□ J	R59 – R62, R75, R76
	RD1/2PS □□□ J	R11 – R22, R35, R36, R47, R48
	RD1/4PM □□□ J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
★★	ASR-074	RL1 – RL4 Relay
★★	ASX-193	S1 Remote slide switch (PHONO SELECTOR)
	VBZ30P080FZK	Screw (3 x 8)

Tape Switch Assembly

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	IR2E01	Q1
★★	2SC2603/A/	Q2, Q3
★	AEL-404	D1 – D4 (LED Red)

SWITCHES

Mark	Part No.	Symbol & Descriptions
★★	SEA6V4B4B4L	S2 Push switch (TAPE MONITOR)
★★	SEA8V222L	S3 Push switch (TAPE COPY)

Mark	Part No.	Symbol & Description
★★	SEA5V4B4S	S4 Push switch (LINE STRAIGHT, SUBSONIC)
★★	SEAV2S	S5 Push switch (RANGE)

CAPACITORS

Mark	Part No.	Symbol & Description
	CEA 470M 25L	C1, C3
	CEA 0R1M 50L	C2
	ACE-225	C4, C5 Metallyzed mylar (0.22/200V)

RESISTORS

Note: *When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

Mark	Part No.	Symbol & Description
	RD1/4PM □□□ J	R8 – R11, R14 – R20
	RD1/8PM □□□ J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
	VMZ30P060FMC	Screw (3 x 6)

Power amp. (R) Assembly

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★	1S1555	D101, D113, D114, D119, D120, D128, D130, D131
★	S5566	D103, D104, D109 – D112, D129
★	1S2471	D132 – D135
★	MZ-047	D123, D124
★	WZ-061	D117, D118
★	STV2H	D102
★	KZL110	D127
★★	2SK170-BL	Q114
★★	2SJ74-BL	Q113
★★	2SC1845	Q127, Q129, Q135
★★	2SA992	Q128, Q130, Q136
★★	2SA1145P	Q107, Q115, Q118
★★	2SC2705P	Q108, Q116, Q117
★★	2SA1115/A/	Q110, Q111, Q137, Q138
★★	2SC2603/A/	Q109, Q112
★★	2SC2240	Q126
★★	2SA970	Q125
★★	2SC1438	Q101, Q102
★★	2SA857	Q103 – Q106
★★	2SA968B	Q120
★★	2SC2238B	Q119
★★	TH102-2	TH101

CAPACITORS

Mark	Part No.	Symbol & Description
	CEYA 100M 25	C111, C112
	ACE-066	C104 Mylar (0.01/100V)
	ACE-067	C113, C114 Mylar (0.1/100V)
	ACE-086	C108, C109 Mylar (0.0012/100V)
	ACE-071	C105 Polystyrene (1000p/125V)
	CMA 470J 500	C106, C107
	CMA 221J 500	C118, C119, C124, C131, C132
	CMA 101J 500	C101
	ACE-085	C134, C135 Mylar (0.0015/100V)
	ACE-098	C133 Polystrene (2200p/125V)
	ACE-065	C115 Polystrene (4700p/125V)
	CQMA 222K 50	C127
	CQMA 103K 50	C130
	CCDSL 560K 500	C122, C123

RESISTORS

Note: *When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

Mark	Part No.	Symbol & Description
	ACP-019	VR101 Semi-fixed (100)
⚠ ⚠ ⚠	RF1/4PS □□□ J	R109, R118 – R121, R130, R131, R133 – R138, R144, R145, R198, R199
⚠	RF1/2PS □□□ J	R142, R143
	RS1P103J	R187, R188
⚠	RD1/4PMFL □□□ J	R101, R102, R105, R106, R114, R166, R167
⚠	RD1/4PMF □□□ J	R123–R129, R132, R156–R159, R162, R163
	RD1/2PS □□□ J	R107, R108, R126, R141, R189, R197
	RD1/4PM □□□ J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
	VBZ30P080FMC	Screw (3 x 8)

AF Assembly (GWK-216)

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	TC4011BP	Q123
★★	NJM4558DX	Q119, Q211
★★	2SC2240	Q203 – Q206, Q505, Q507
★★	2SC1438	Q103 – Q110, Q113, Q114,
★★	2SC2603/A/	Q121, Q122
★★	2SC1827	Q115, Q116, Q502, Q504
★★	2SA970	Q207 – Q210, Q506, Q508
★★	2SA1115/A/	Q120
★★	2SA857	Q111, Q112
★★	2SK129A	Q201, Q202
★★	2SK194	Q101, Q102
★★	2SA769	Q117, Q118, Q501, Q503
★★	2SK373-Y	Q509, Q510
★	1S1555	D103 – D106, D113, D505, D506
★	S5566	D205 – D212
★	MZ-056	D115
★	MZ-130	D114
★	EP01Z	D109 – D112
★	WZ-100	D503, D504
★	KZL140	D201, D202

CAPACITORS

Mark	Part No.	Symbol & Description
	ACH-444	C127, C128, C207, C208 Electrolytic (22/50V, NP)
	CEYA 100M 50	C509, C510
	CEYA 101M 25	C505, C506
	CEAYA 102M 16	C201, C202
	CEXA 221M 50	C131, C132, C511, C512
	CEXA 221M 100	C501, C502
	ACE-068	C117, C118 Mylar (0.047/100V)
	ACE-066	C103, C104 Mylar (0.01/100V)
	ACE-086	C105, C106, C213, C214 Myler (0.0012/100V)
	ACE-095	C107, C108 Polypropylene (0.12/100V)
	ACE-094	C111, C112 Polypropylene (0.033/100V)
	ACE-097	C119, C120, C125, C126 Polystyrene (0.01/160V)
	ACE-071	C129, C130 Polystyrene (0.001/125V)
	ACE-089	C113, C114 Polystyrene (470p/125V)
	CMA 221J 500	C115, C116, C203, C204, C507, C508
	CMA 470J 500	C101, C102, C211, C212
	CMA 100D 500	C121 – C124
	CEANL 4R7M 50	C133
	CQSH 561J 50	C205, C206
	CKDYF 103Z 50	C136
	CKDYF 473Z 50	C137

RESISTORS

Note: *When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

Mark	Part No.	Symbol & Description
	RDH1/4P □□□□ F	R115, R116, R119 – R122
	RDH1/4P □□□ J	R101, R102, R143, R144, R149, R150, R203, R204, R217, R218, R171, R172, R515, R516
	RT5B 560K	R503, R504
⚠	RF1/4PM6R8J	R501, R502
⚠	RD1/2PSF 220J	R137 – R140
	RD1/2PS □□□ J	R111, R112, R159, R160, R201, R202, R231, R232
⚠	RD1/4PMF 010J	R505, R508
	RD1/4PM □□□ J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
★★	ASR-072	RL1 Relay

Servo Regulator Assembly

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★	KZL140	D401, D402

CAPACITORS

Mark	Part No.	Symbol & Description
	CEYA 102M 16	C401, C402

RESISTORS

Note: *When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

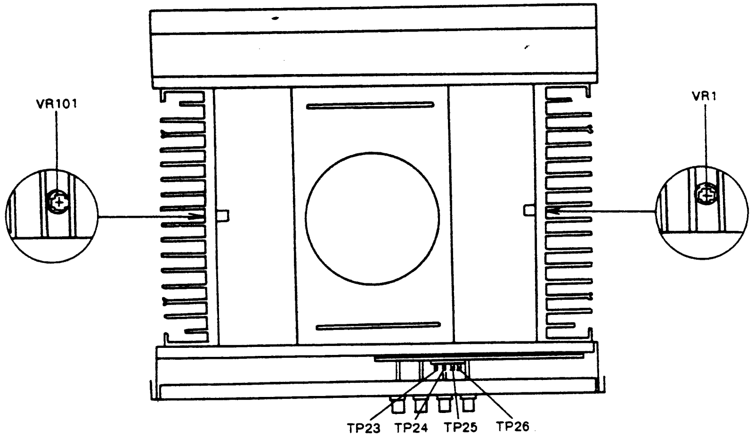
Mark	Part No.	Symbol & Description
	RD1/2PS102J	R401, R402

10. ADJUSTMENTS

Idle Current Adjustment

1. Turn the VOLUME control down to minimum volume, and switch the LINE STRAIGHT switch on.
2. Rotate VR1 and VR101 counter clockwise.
3. Switch the power on with no input and no load applied to the unit.
4. Adjust VR1 to obtain a reading of 25mV ~ 30mV between TP25 (+) and TP26 (−). (L ch)
5. Adjust VR101 to obtain a reading of 25mV ~ 30mV between TP24 (+) and TP23 (−). (R ch)
6. Readjust after aging for at least 30 minutes.

Reference:
Center DC output voltage tolerance: 0V±50mV.



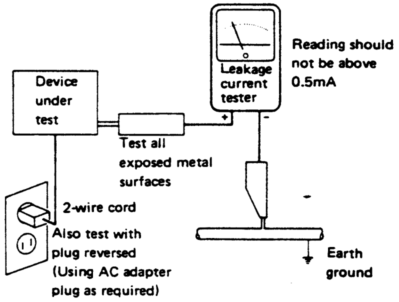
11. SAFETY INFORMATION

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.


Device under test
Leakage current tester
Reading should not be above 0.5mA
Test all exposed metal surfaces
2-wire cord
Also test with plug reversed (Using AC adapter plug as required)
Earth ground

AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.
The use of a substitute replacement component which dose not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

12. PACKING

PACKING

Mark	No.	Part No.	Description
	1.	AHA-328	Side pad L
	2.	ARB-561	Operating instructions (English)
	3.	AHA-329	Side pad R
	4.	AHC-067	Wrapping case
	5.	AHE-205	Packing case